

# SUPPLEMENT.

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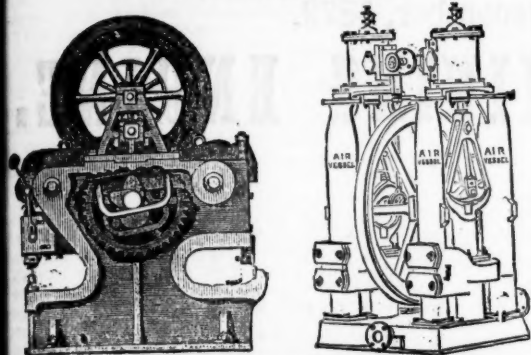
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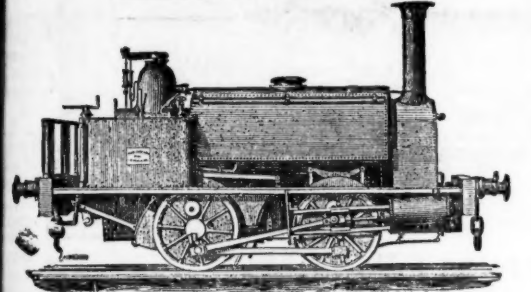
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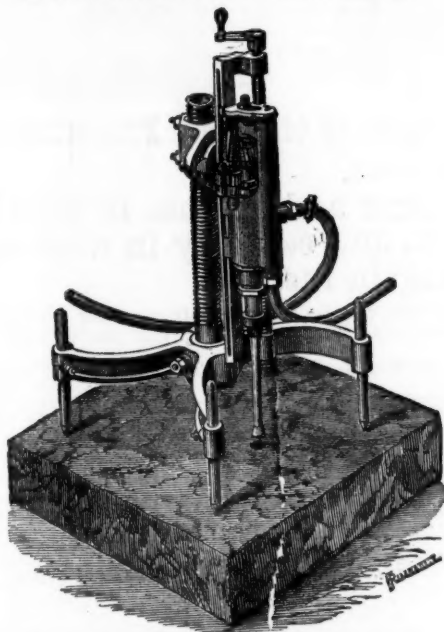
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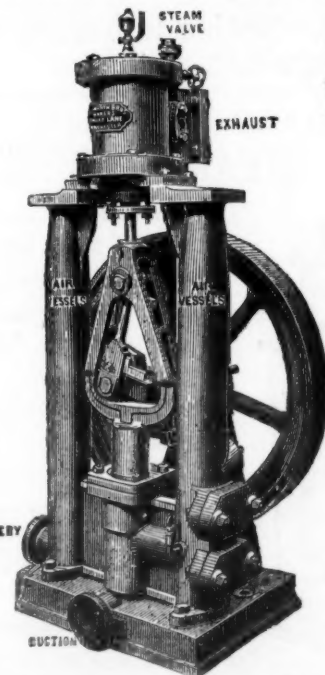
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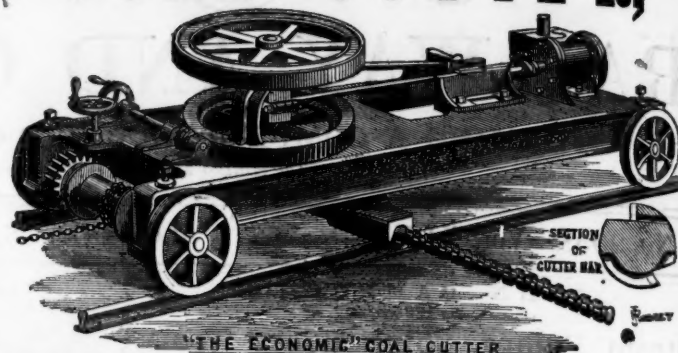
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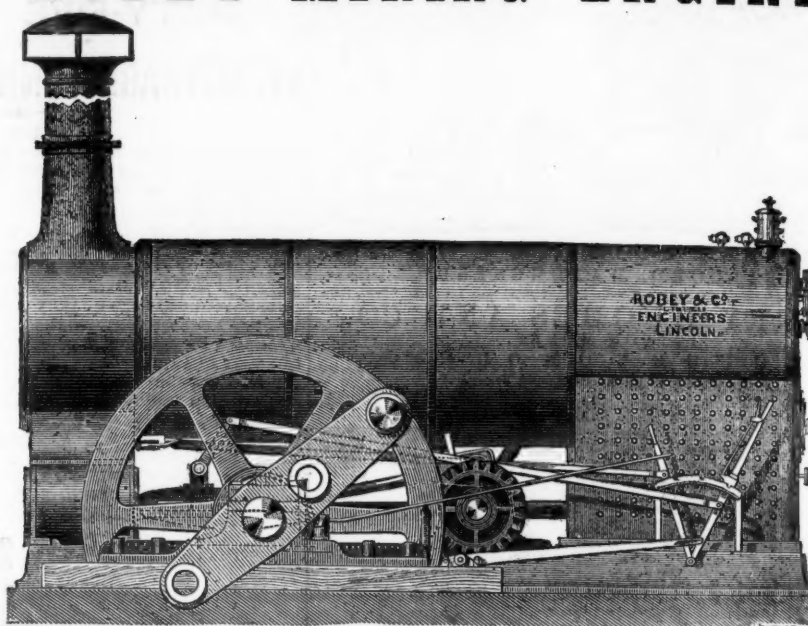
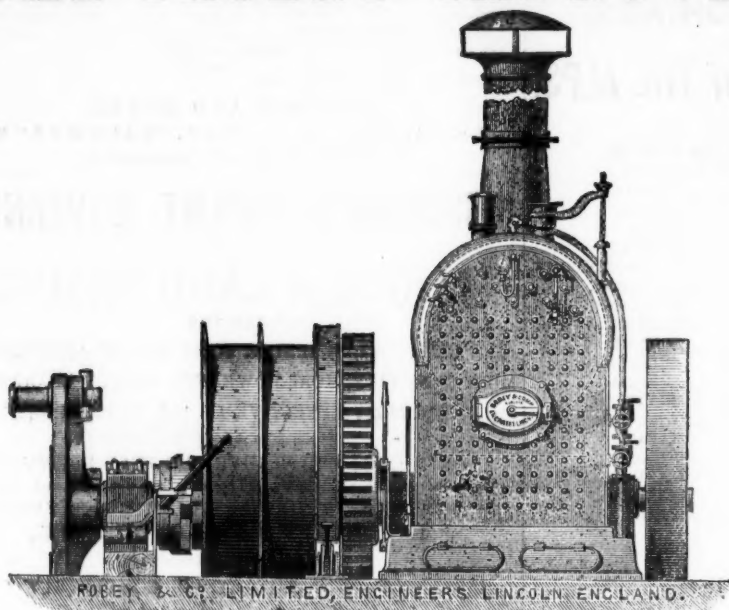
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## Original Correspondence.

## THE CHANNEL TUNNEL SCIENTIFICALLY AND COMMERCIALY CONSIDERED.

The conclusion of preliminary arrangements between the English and French representatives of the Channel Tunnel project has once more called attention to the question of the practicability of the undertaking, in which is involved the still more important consideration of whether it is worthy of support as a commercial enterprise, or in other words whether it will be likely to return to capitalists anything like a reasonable interest upon the money which would have to be invested in its construction. At the present moment both these points are well worthy of thoughtful calculation. That a tunnel 20 or 23 miles long can be constructed without intermediate shafts there is not a shadow of a doubt, but in the establishment of a submarine passage between France and England this does not cover the whole question since under the most favourable conditions conceivable the Channel Tunnel would have to be driven within a comparatively few feet of no smaller body of water than the English Channel, and practically speaking its success is dependent upon the absence of fissures or permeable strata throughout the distance. To enable an opinion to be formed upon this portion of the subject nearly all the necessary data were given in the paper read before the Institution of Civil Engineers by Mr. J. Prestwich, F.R.S., now professor of geology at the University of Oxford, and in which the geological conditions affecting the construction of a tunnel between England and France were dispassionately considered. Mr. Prestwich reviewed the geological conditions of all the strata between Harwich and Hastings, on one side of the Channel, and between Ostend and St. Valery on the other side, with a view to serve as data for any future project of tunnelling, and to show in what direction enquiries should be made. The points considered were the lithological characters, dimensions, range, and probable depth of the several formations. The London clay at the mouth of the Thames was from 300 ft. to 400 ft. thick, while under Calais it was only 10 ft., at Dunkirk it exceeded 264 ft., and at Ostend it was 443 ft. thick. He considered that a trough of London clay from 300 ft. to 400 ft. or more in thickness extended from the coast of Essex to the coast of France. Judging from the experience gained in the Tower Subway and the known impermeability and homogeneity of this formation, he saw no difficulty, from a merely geological point of view, in the construction of a tunnel, but there was a difficulty in the extreme distance, the nearest suitable points being 80 miles apart. The lower tertiary strata were too unimportant and too permeable for tunnel work. The chalk in this area was from 400 ft. to 1000 ft. thick; the upper beds were soft and permeable, but the lower beds were so argillaceous and compact as to be comparatively impermeable; in fact, in the Hainaut coal fields they effectively shut out the water of the water-bearing tertiary strata from the underlying coal measures. Still, the author did not consider even the lower chalk suited for tunnel work, owing to its liability to fissures, imperfect impermeability, and exposure in the Channel.

Now, it was precisely the facilities which the chalk offered for tunnelling through that has been urged by most of the leading advocates of the Channel Tunnel, and it was in consequence of relying upon having nothing harder than chalk to deal with that Mr. Brunton designed his very ingenious "mechanical cheese-cutter," so that the opinion of such an authority as Mr. Prestwich that the chalk is unreliable is certainly not very acceptable. The gault, Mr. Prestwich considered, was homogeneous and impermeable, but near Folkestone it was only 130 ft. thick, reduced to 40 ft. at Wissant, so that a tunnel would hardly be feasible. The lower green sands, 260 ft. thick at Sandgate, thinned off to 50 or 60 ft. at Wissant, and were all far too permeable for any tunnel work. Again, the Wealdon strata, 1200 ft. thick in Kent, were reduced to a few unimportant rubby beds in the Boulonnais. To the Portland beds the same objection existed as to the lower green sands—both were water-bearing strata. The Kimmeridge clay was 300 ft. thick near Boulogne, and no doubt passed under the Channel; but in Kent it was covered by so great a thickness of Wealdon strata as to be almost inaccessible; at the same time it contained subordinate water-bearing beds. Still, the author was of opinion that in case of the not improbable diminution of the Portland beds it might be questionable to carry a tunnel in by the Kimmeridge clay on the French coast, and out by the Wealdon beds on the English coast. The oolitic series presented conditions still less favourable, and the lower beds had been found to be water-bearing in a deep artesian well recently sunk near Boulogne. Passing on to the consideration of the Palaeozoic series, to which his attention was more particularly directed while making investigations as a member of the Royal Commission on the probable range of the coal measures under the South-East of England, he showed that these rocks, which consisted of hard Silurian slates, Devonian and carboniferous limestone, and coal measures, together 12,000 ft. to 15,000 ft. thick, passed under the chalk in the North of France, outcropped in the Boulonnais, were again lost under newer formations near the coast, and did not re-appear until the neighbourhood of Frome and Wells was reached. Although not exposed on the surface, they had been encountered at a depth of 1032 ft. at Calais, 985 ft. at Ostend, 1026 ft. at Harwich, and 1114 ft. in London. They thus seemed to form a subterranean table-land of old rocks, covered immediately by the chalk and tertiary strata. It was only at the southern flank of this old ridge that the Jurassic and Wealdon series sets in, and beneath these the Palaeozoic rocks rapidly descend to great depths. Near Boulogne these strata were already 1000 ft. thick, and at Hythe the author estimated their thickness might be that or more.

Supposing the strike of the coal measures and the other Palaeozoic rocks to be prolonged from their exposed area in the Boulonnais across the Channel, they would pass under the cretaceous strata somewhere in the neighbourhood of Folkestone, at a depth estimated by the author at about 300 ft., and near Dover at about 600 ft., or nearly at the depth at which they had been found under the chalk at Guines, near Calais, where they were 665 feet deep. These Palaeozoic strata were tilted at high angles; and on the original elevated area they were covered by horizontal cretaceous strata, the basement beds of which had filled up the interstices of the older rocks, as though with a liquid grouting. The overlying mass of gault and lower chalk also formed a barrier to the passage of water so effectual that the coal measures were worked easily under the very permeable tertiary and upper chalk of the North of France; and in the neighbourhood of Mons, notwithstanding a thickness of from 500 ft. to 900 ft. of strata charged with water, the lower chalk shut the water out so effectually that the coal measures were worked in perfect safety, and were found to be perfectly dry under 1200 feet of thin strata combined. No part of the Straits exceeded 186 feet in depth. The author, therefore, considered that it would be perfectly practicable, so far as safety from the influx of the sea water was concerned, to drive a tunnel through the Palaeozoic rock under the Channel between Blanc Nez and Dover, and he stated that galleries had actually been carried in coal under less favourable circumstances for 2 miles under the sea near Whitehaven. But, while in the case of the London clay the distance seemed almost an insurmountable bar, here again the depth offered a formidable difficulty. As a collateral object to be attained, the author pointed to the great problem of the range of the coal measures from the neighbourhood of Calais in the direction of East Kent, which a tunnel in the Palaeozoic strata would help to solve. These were, according to the author, the main conditions which bore on the construction of a submarine tunnel between England and France. He was satisfied that, on geological grounds alone, it was in one case perfectly practicable, and in one or two others possibly so; but there were other considerations besides those of a geological nature, and whether or not they admitted of so favourable a solution was questionable. Granting the possibility of the work in a geological point of view, there were great and formidable engineering difficulties; but the vast progress made in engineering science during the last half-century led the author to imagine that they would not prove insurmountable if the necessity for such a work were to arise, and the cost were not a bar.

Now, it is precisely the cost which should deter capitalists, whether French or English, from connecting themselves with the under-

taking. The cost of maintaining the tunnel in working order, even assuming it to have been constructed, would be enormous. The pumping and drainage arrangements would have to be as vast as at our largest mines, and it is not at all improbable that the largest pumping power we have at present would prove inadequate. Even in the case of the Thames Tunnel constant pumping was found necessary, yet the material above it was far more impermeable than can be hoped for in the case of the Channel Tunnel; whilst with regard to the prospects of profits being earned for those, should there be any, who provide the funds it was pointed out by one of the most competent members of the Institution of Civil Engineers that the required traffic could not be hoped for. It was, moreover, remarked that of a tunnel under the Straits of Dover would probably cost 40,000,000 a year for ventilation alone, and that, taking the cost of the tunnel at 10,000,000, it would require a gross traffic of 1,200,000, a-year to make it pay commercially, or 824, per mile per week. The largest known traffic—that on the Metropolitan Railway—realises 1000, per mile, so that the traffic between Dover and Calais must be as busy as that of London itself to make any tunnel answer; or, compared with another most prosperous railway, the traffic under the sea must be five times that of the Lancashire and Yorkshire, eight-and-a-half times that of the London and North-Western, and thirteen times that of the Great Western, before any suitable dividend could be paid. It is, moreover, extremely problematical whether the 10,000,000, would suffice for the construction of the tunnel, since there are 18,500 fms. of driving to be done from two ends only (the approaches being left out of the question), so that admitting 10 fms. per day to be driven at each end—a speed considerably greater than any which has yet been attained—a larger proportion of the 10,000,000, would be absorbed for salaries of officers performing no useful work. Even in the St. Gothard Tunnel at the Airolo end, where they are driving in so compact a schistose granite, that permeability might be regarded as impossible, the percolation of water from the comparatively dry mountains over the tunnel is so great that a conduit a metre square (1600 square inches area) is necessary to keep the tunnel drained; and whilst in the case of St. Gothard and other Alpine tunnels the water flows off naturally, it is obvious that in the case of the Channel Tunnel every gallon will have to be pumped, the cost of pumping being that which consumes the whole profits of many of the best collieries, and renders the otherwise valuable coal seams which they contain commercially worthless.

The discussion by the Institute of Civil Engineers of Mr. Prestwich's paper "On the Geology of the British Channel" demonstrated beyond the possibility of question that commercially such a project could not prove advantageous or remunerative. The President of the Institution (Mr. Thomas Hawksley), Prof. Ramsay, Sir John Hawkshaw, Mr. Bateman, and others took part in the discussion, and the opinion appeared to be unanimous that the geological aspects of the case were not encouraging. The London clay beds, involving a distance of 100 miles from shore to shore, along a curved line, which in itself would be a serious engineering difficulty, met with no favour. The Kimmeridge clay, with the possibility of its uncomfortable union with the Weald clay, was not looked upon as much more hopeful; whilst the depth—probably 1000 ft. or more—of the Palaeozoic rocks, in which the author of the paper considered there was the best prospect, involved a ten miles descent in the land on either side of the Channel to and from the tunnel. But the geological objections are altogether insignificant compared with the commercial objections. Even assuming the railway to be constructed and kept fully in operation night and day, and to carry freight and passengers at the highest possible rate that could be charged in face of the competition of the overseas transit that would have to be met, it would be impracticable to earn sufficient to pay 1 per cent. per annum interest to the capitalists, if any were found thoughtless enough to sink their money in the project.

## QUICKSILVER EXTRACTION IN SARAWAK.

SIR.—In last week's Journal I notice an abstract from a paper read by Mr. Thomas Down before the Tyne Chemical Society on Nov. 24, "On Mining and Smelting in Sarawak." He there refers to the ores of antimony and cinnabar, and after describing the method of treatment of the latter in retorts he makes reference "to the description in the Journal of Nov. 1, 1873, of a retort invented by Mr. H. Bankart, when superintendent of the Napa Quicksilver Mining Company, and thinks that it has several advantages over that which he described." To this will you permit me to add a few words? If Mr. Down allows the mercurial vapours to pass direct into the water experience must show him that it is a grave error; the water will become more or less heated, and that vapour rising will unite with the mercurial fumes, thereby forming what is known as mercurial soot, which not only chokes up the pipes, but is very difficult to treat afterwards in such large quantities, for no matter what process is used subsequently, whether by treatment with lime or by boiling with wood ash and lime, it is impossible to separate all the mercury; there is always more or less oil or bitumen united with it. The pipes should lead into a condenser around which, but not in, the water should always flow, thus keeping the mercury always pure, and avoiding the manufacture of soot. The size of the retort, as described by Mr. Down, is too small for economical works on a large scale, and nothing tends more to salivate the workmen than loading or unloading the retorts by hand. There is no necessity for it, as made clear in the description of my new retorts before referred to. The last paragraph of Mr. Down's account is somewhat startling at the present day. He says, "It was decided some time ago to build a furnace and condensing flues, similar to those now in use in the new Almaden Mines, in California." These have long been condemned as the most extravagant and wasteful of all furnaces hitherto put up; and, were it not for the enormous outlay required, they would long ago have been substituted for furnaces of a much improved stamp. As it is, the present manager is doing all he can to modify and improve upon the old method, and, as far as possible, using iron condensers. Brick furnaces and brick condensers are extremely wasteful, acting like a sponge. If the antimony and cinnabar are united in Sarawak as they are in one part of California the retort described by me can work the united ores at the one process, giving off all the mercurial vapours, and reducing the antimony into regulus. Mr. Down speaks of a loss of 4 per cent.; this is a very serious loss, and might readily be obviated.

I have lately much improved upon the horizontal retort. It is a furnace consisting of a circular shaft of fire-brick 60 ft. high (a smaller one can be erected), 8 ft. diameter at the bottom and 6 ft. at the top, within which is a cast-iron cylinder in sections, with flanges 6 to 8 in. wide, cast spirally on to each section, fitting close to the brickwork, so as to form a continuous flue for the flame to pass round and round the cylinder from the bottom to the top. Over this cylinder is placed an iron self-feeding hopper, to the bottom of which is secured a circular plate of boiler-iron, which is slotted in one direction, so as to form parallel bars about an inch wide. Above this plate is a revolving plate of similar construction attached to the lower end of a vertical shaft, which bears in the fixed plate, and can be moved at any required speed by means of belting or other device at the top. In the framework of this hopper, and underneath the fixed plate, is a damper, which can be opened and closed at will by the workmen. A screw carries the ore from the mixing chamber, after it is crushed by stamps, rollers, or stone-crushers, to the hoppers. There are three fire-places at equal distances from one another around the shaft, about 3 ft. from the bottom, and three others at different heights, about 12 ft. above one another. The latter are supported on hollow iron pillars. The flue has a lip or apron to protect the descending ore from luting. At the bottom of the shaft there is a conical hearth, upon which the ore falls. Prior to discharging every hour the ore is tested by means of a copper rod passed through a pipe in the cylinder, which will at once indicate whether there still remains any mercurial fumes. When ready for drawing the belting on the shaft in the hopper is run out of gear, and a screw turned at the base of the furnace, which forces open two doors in the lower section of the cylinder, and the ore of its own gravity descends into the cars, which are waiting below in the closed chambers. The belting is then set in gear again, and this process continues forever. The fumes pass into the pipe

behind the lip or apron, and are drawn through the condensing pipes by force of an artificial draught from an open fire-place in a chimney beyond the final condenser.

When about 10 or 15 ft. from the furnace the fumes commence to be condensed by the continual sprays of cold water descending over the pipes, and forced against the vertical pipe, which then continues under a flow of cold water into the final condenser. Nothing can, therefore, escape if the water be kept always cold. The smoke from the fires passes out at the top flue into another chimney. By the use of lime to take up the sulphur, and the non-admission of oxygen, the fumes pass through the pipes free from sulphuric acid, thus enabling the use of wrought-iron pipes of a small calibre, instead of large cast-iron ones, which is in itself a vast saving in the reduction of the ores; added to which the soot, which so largely accumulates in the open continuous furnaces, is reduced to a minimum. By the above process from 50 to 75 tons of ore can be treated every 24 hours, at a small cost. I shall be glad to give any further particulars that may be desired either by Mr. Down or any other interested party in the working of quicksilver ores upon application to me, at Murton-street, Sunderland. HUBERT BANKART.

## MINING IN THE PACIFIC STATES.

SIR.—Since my last letter of Dec. 31 the excitement on the San Francisco Stock Exchange has continued with unabated force. Prices have continued to advance in the most astonishing manner. Consolidated Virginia is now quoted at 700, equal to \$75,000,000 for the mine. California is selling at 765, equal to \$82,600,000, or within about \$3,000,000 of what the leading 13 mines were selling for in May, 1872, and twice as much as the same mines sold for in June of last year. Ophir has advanced to 290, equal to \$29,232,000. All the rest of the list has advanced, and the market is very firm. The Belcher Company have declared a dividend for January of \$3 per share, equal to \$312,000, increasing the aggregate dividends of this company to \$12,376,000 since November, 1870.

The latest mail advices from San Francisco are to Dec. 31. On that day it is stated that there was a great deal of excitement at the office of the Consolidated Virginia Company, on receipt of ores from the different cross-cuts; from cross-cut No. 2 the samples ran \$2300 per ton; from cross-cut No. 1, which is on the California line, the ore ranges over \$20,000 per ton, being almost pure silver, which in bars is \$37,000 per ton, but this ore contains in addition a high percentage of gold. The drift running north in the 1550 ft. level of the Consolidated Virginia is in exceedingly rich ore; a winze has been sunk from it to a depth of 80 ft., continuing in the same grade of ore. The same drift, continuing north, on approaching the California line, has come into very high-grade black sulphurets, samples from which on Dec. 31 assayed \$24,000 per ton.

The developments on the Comstock are undoubtedly wonderful, but it is reasonable to suppose that the present high prices of shares will not be maintained. When speculators commence to realise prices must fall off. One thing that sustains the market at present is the large orders which have been received from New York and London; if these orders are for investment I do not doubt but what they will prove profitable, but if merely for speculation I am afraid that the people of the East will find out that they have "come in" too late, and have merely assisted their friends of the Pacific Coast to realise.

Money in New York is very plentiful, but still very inactive. The bank statements both here and in Boston show the accumulation of funds to a large extent in bank. There is already considerable disposition displaying itself to look into mining matters, although I have not yet heard of any large operations.

The Herrmann Mining Company of New York was recently organised, with a working capital of \$40,000, to develop the Dunkirk silver lode, near Georgetown, Colorado, and to which reference was made in one of my previous letters. The reports from Colorado are of the most encouraging nature. It is estimated that Clear Creek county will turn out as much bullion for the year ending next July as the whole Territory did the preceding year. A company has been formed in Trenton, New Jersey, for the purpose of erecting works and concentrating ores in Georgetown, Colorado; these works will be of immense benefit to Griffiths and the adjoining districts, in enabling a number of low-grade mines to ship ores which, without concentration, would be worthless; the capacity of these works will be about 100 tons per day. There is enough low-grade ore in this neighbourhood now to supply works with a capacity of 500 tons per day. There is a great deal of talk about the San Juan district, in Colorado. I have spoken to a number of miners and prospectors who spent the past season there, and their accounts are very contradictory. My impression is that it will turn out a very valuable district; the ores are not very high grade, and will consequently in many instances require concentration, but from all accounts there must be an immense quantity.

Some Philadelphia and Boston people have been turning their attention to properties in California Gulch, near Oro City, in Colorado. An engineering friend of mine, who was sent out to examine the Printer's Bay lode, gives a very flattering report; the rock is porphyritic; the vein is streaked with talc, which appears to contain all the gold in a free state to the depth of 300 ft., at which point the sulphurets make their appearance. The average of the milling ore was about \$30 per ton. A large pocket, struck in October, is still being worked; three weeks run is said to have yielded 900 ozs. of gold, or about \$14,000. Capt. Breeze's mine is at present idle, the main shaft having caved in. A ditch company is about completing their ditch, which it is expected will give rise to extensive placer work in the head waters of the Arkansas river in the spring. A great deal of prospecting is going on in California and Wisconsin gulches.

We hear a great deal about the Lake County quicksilver mines in California. Several companies owning properties there have been very successful, notably the Etna, Phoenix, and Great Western. The great advance in the price of quicksilver has, of course, been a strong stimulant to these mines. The demand for this metal in America was never greater, or more likely to improve, than now; and very fortunately a great number of new gold and silver mines are coming into operation, with the most promising results. A few years since, when the New Almaden and some others were at the height of their productive powers, the supply was far in excess of the demand. The general run of ore in the successful gold and silver mines was also lower grade than of late, and required a smaller quantity of quicksilver for amalgamation. The production was, therefore, restricted, the mine owners not being willing to squander the metal at prices that would not pay, when at some future time the demand would increase; this has taken place generally throughout the West, notably in Nevada, where the Comstock Mines use very much more of the metal than formerly. The New Almaden now produces much less; with its utmost efforts its production is now about 1000 flasks per month; this, taken in conjunction with the condition of affairs in Spain, and the efforts of a strong "bull" clique in Europe and America, has sustained the price at a very high figure. Prospecting of new quicksilver districts is being rapidly pushed, and every week we hear of new companies. The Lake County veins of cinnabar appear to be of very large size, and averaging from 2 to 10 per cent. of quicksilver. A lot of about 200 lbs., sent to me for assay from the neighbourhood of the Great Western Mine, contained 76 per cent. of quicksilver.

The market for copper in New York is strong, and has an upward tendency; the price is 1½ cent per pound lower than at the close of last year. Stocks are light, and the manufacture of brass and copper goods in the United States is showing signs of renewed activity. The shipments from Lake Superior have stopped in consequence of the closing of navigation, with the exception of about 3,000,000 lbs., which will find its way down by rail from some of the smaller mines which cannot afford to carry it over the winter.

The stock of copper on Jan. 1, 1874, was estimated at.....	lbs.	10,000,000
Product of Lake Superior in 1874 .....	33,000,000	
Product of Tennessee and Baltimore.....	4,000,000	
Total .....	47,000,000	
Consumption estimated at—Jan. to June, 1874.....	lbs.	10,000,000
July to Dec., 1874.....	18,000,000	
Export.....	9,000,000	
Leaves stock in hand on Jan. 1, 1875 .....	lbs.	10,000,000

Of this amount scarcely 4,000,000 lbs. are left on hand in first hands.



The price from January to July last year was steady at 24 to 25 c.; fell to 19 c. in August, bringing down several heavy houses with it; from that point it has steadily advanced to 23 c. at the close of the year. The Lake Superior mines have been very successful the past season. Hecla and Calumet produced upwards of 20,000,000 lbs. 52, Broadway, New York, Jan. 8. D. ERNEST MELLISS.

#### MINING ON THE PACIFIC COAST—NEVADA.

TYBO MINING DISTRICT, NYE COUNTY, NEVADA, AND THE TYBO CONSOLIDATED SILVER MINING COMPANY (LIMITED) OF LONDON—No. V.

SIR.—In letter No. IV. of this series I gave to your readers a brief description of that portion of the above company's property embraced within the limits of the Casket, Lafayette, and Crosby Mines. In that I described the character and extent of their developments, and foreshadowed the prosperous season which awaited them when they came to be opened and worked in a manner commensurate with their mineral wealth. The outside improvements, too, received some attention, but not enough, I fear, to convey to the mind anything like a just estimate of their value and importance when considered in connection with the mining enterprise of which they form necessary adjuncts. I shall, however, have occasion by-and-by to refer more immediately to the large sums which have been already swallowed up in the cost of their construction. But however large has been the expenditure heretofore, the amount will be immeasurably augmented ere the genial rays of the summer's sun shall have gladdened us with their approach. Costly structures, such as mills and furnaces, cannot be erected without the consumption of much time and labour; neither can a great mining scheme, such as this is, be at once placed upon a paying basis, nor, indeed, set in motion at all, without large sums are spent upon it. A 20-stamp mill and a 60-ton cupola furnace, both of which are to be ready for active work by the 1st of May, with a couple of large hoisting works added, and the sinking of the vertical shafts over which they are to be placed, will involve no inconsiderable outlay ere they are completed. It will, therefore, be safe to say that the already large construction account will have to be increased by the addition of at least \$120,000 more. Less than this amount will not suffice to provide the reduction and working facilities that are at present so much needed. One small cupola furnace (25 tons capacity) is found to be entirely inadequate to our wants, and until the completion of the aforesaid mill and furnace the company will have to work at a disadvantage.

However, with the erection and active employment of these additional reduction works, a prosperous condition of things will most assuredly follow. Nothing but the grossest mismanagement and neglect can then prevent such a result from taking place. With every element that is necessary to ensure entire success largely at the disposal of the company's officers may we not reasonably hope to be blessed with a measure of prosperity greater than we have yet enjoyed? Assuredly we may, if there is an honest, honourable, straightforward policy pursued on the part of the management. Without there is, not only in this, but in the direction of the affairs of similar institutions, all will prove unavailing. Great natural resources may be placed within the reach of a company, and every facility for utilising and rendering them subservient to its wants given it; money may be subscribed, assessments levied, and everything desirable or that may be required most bountifully supplied, yet without there is an honest, capable, intelligent man, of enlarged views and practical experience, placed at its head, all of these advantages would be found to be of little account. A man may be possessed of considerable skill in mining affairs, and he also may have a tolerable understanding of the various branches of metallurgy, and yet be deficient of the very qualities that would fit him for the position of superintendent or manager, in whom should be blended both executive and financial ability of no mean order. These things are, however, too often overlooked by boards of directors in the selection of superintendents. Family influence and injudicious favoritism but too readily carry the day against experience and ability when such selections have to be made by English companies. Here in America the reverse is the case, hence the less necessity there is for a resort to the services of the winding-up court.

But to return. Here we have an abundance of both milling and smelting ores, and when the means of profitably reducing them is given us all will go as merry as a marriage bell. There is nothing but this means wanting to the furtherance of the company's prosperity. With it the company will immediately be placed upon a paying basis, and quarterly, or semi-quarterly, and may be monthly, dividends will then become the order of the day. With a mill and two furnaces in full blast the former, at least, will be possible, if not either of the two latter. Then can the promoters of this great enterprise point with mingled feelings of pride and pleasure to the greatness of the work they will have achieved, and to the stupendous obstacles which had to be met and overcome ere any degree of success could have been attained.

It is, however, time that I should turn to the "Two G's" Mine, which is the fourth and best developed of the series which comprise the property of the Tybo Company. This now famous mine was, with the others, located in 1870. It was subsequently worked, though on a limited scale, by its discoverers, whose pecuniary condition was not the healthiest. It lies to the south-east of the three former, and courses obliquely across the lateral ridges and canyons of Precipice Mountain, which rises, as I have said elsewhere, to a height of 2000 ft. above Precipice Canyon, which cuts through the full course of the Casket and Lafayette Mines.

The "Two G's" contain 1200 lineal feet on the course of the lode, and is at present waiting to be opened by a series of three tunnels or adit levels to a vertical depth of 188 ft. from the highest point of outcrop from the vein in the hills, across whose slopes the vein takes its course. These tunnels are designated as Nos. 1, 2, and 3. No. 1 was commenced last May, below the lowest point of outcrop of the vein, and has since been driven a lineal distance of 480 ft. along its course. There appears to be, as far as I have been able to judge, an equal amount of milling and smelting ores coursing side by side for this distance along the ledge, which is in all respects about the most uniform and best defined I have ever seen. It is encased between perfect foot and hanging walls, the former composed of porphyry, betwixt which and the ore there runs a casing of soft blue and white clay, and the latter of silicious lime. The smelting and milling ores, as I have said, run parallel to each other along the vein, the line of separation being well outlined, with the latter hugging the hanging-wall or silicious lime side, while the former clings to the foot-wall or porphyry side. The former is a dark, partly decomposed quartz, which will mill readily without being roasted. This class of ore assays from \$50 to \$150 per ton; the latter is, however, above the general maximum, while the former might be said to be the minimum standard. Should it mill up to this rate, or even give net returns of \$25 per ton, the profits would be enormous, for the cost of mining, sorting, hauling, and reducing will not exceed \$20 per ton, and these, I think are, or will be found to be, extreme figures. The ore carries some sulphurets, but not enough, however, to interpose any serious obstacle to its being readily and profitably worked. It will, at all events, require no furnace-blast, which is quite a desideratum with millmen.

Tunnel No. 2, 40 ft. above tunnel No. 1, located at the point of original discovery, has explored the vein over a distance of 500 ft., showing the same ore characteristics met with in No. 1, and like No. 1 has cut through one or two large bonanzas, or ore chimneys, on its course. These chimneys occur at regular intervals, and at such places the lateral expansion is a noticeable feature, though it exercises no material influence upon the richness and uniformity of the remainder of the vein. The best ore is, however, always found in these bonanzas. This is invariably the case whenever they occur. Tunnels Nos. 1, 2, and 3 are connected by a couple of bottomless winzes, through which all the ore mined and to be mined above the former is passed down to that level, from whence it is run in cars to the ore bins at its outer office, to be from there conveyed to the reduction works, one-third of a mile distant. Tunnel No. 3 is still higher up the hill towards the highest point of the lode, which it has penetrated above 100 ft. Here there is found unusually rich ore; it will

yield \$250 per ton, and there are several hundred tons of it exposed to view, awaiting the pick of the miner. From this latter quarter to the opening of tunnel No. 1 the lode is developed to an average depth of 188 ft. as aforesaid, and the lineal distance between the two points indicated is 500 ft., or 5-12ths of the "Two G's" lode, and nearly 1-6th of the whole lode embraced within the boundaries of the "Two G's", Casket, Lafayette, and Crosby Mines, all of which aggregate 3460 lineal feet.

From the level of No. 1 tunnel, which I have shown has opened the mine to a depth of 188 ft.; two incline winzes, 4 by 6 ft., have each been sunk a distance of 75 ft. below it, thus making the first level underneath. The first, or outermost, of these winzes is 150 ft. from the opening of the tunnel, while the second, or innermost, is located 163 ft. further on. They are now connected below by a spacious drift, run through the vein, which at this depth (263 ft.) is not only thicker and richer, but also more uniform in its general character and formation. The vein has been followed on this level some 300 ft., and there have been neither stopping nor raising commenced from it yet. From this level two other winzes have been carried down 60 ft. further, thus making the second level below No. 1 tunnel, and the total depth to which the mine is opened from the uppermost outcrop, 323 ft. Stations have been already cut out, and drifts proceeding with from opposite quarters, to open the space that separates both winzes. From two samples of the ore taken from the ledge at this depth (323 ft.) an assay value of \$331 was obtained from a mixture of galena and grey carbonates, and \$56 from the quartz, or milling, ore, or an average of \$193.50 per ton. This I account a good showing, and one that places the value and permanence of this property beyond a doubt.

The tunnels, drifts, and winzes thus far opened show a solid, well-defined ore vein, of an average thickness of 5 ft., running down at an angle of 76°, encased between perfect foot and hanging walls. In order to exhibit to the uninitiated the value of this property I will here, for the sake of illustration, give an example of the vast quantity of pay-ore which the "Two G's" vein alone should produce, provided it yielded throughout its lineal extent (1200 ft.) and depth (323 ft.) the same as it is at present, and preserved the same thickness (5 ft.). By cubing these figures I have before me a product of 1,938,000 ft., which I divide by 15, the number of cubic feet in a ton of this ore, to bring them to tons, and I still have before me, in indisputable figures, the enormous amount of 129,200 tons of smelting and milling ores, representing a coin value of \$3,229,000. These figures are based upon the ore yielding net returns of \$25 per ton, and this it will do, seeing that it works at present from 80 per cent. to 90 per cent. above this amount.

But since some persons may object to my taking or including the undeveloped portion of the mine ("Two G's") lying to the south-east, I will strike it out altogether, and will confine myself to that portion of it which I have shown is developed longitudinally 550 feet, and vertically 323 feet, and 5 feet thick. Cubing as above, I have a product in round numbers of 896,325 feet, which, divided as formerly, leaves a product of 59,755 tons of available ore, which at \$25, as aforesaid, gives a net return of \$1,493,875, or \$243,875 more than the property has been stocked at, and all from 550 feet in length by 323 feet in depth! When such grand figures as these are placed before us, the result of so small a space, what may we not expect when the whole of the 3460 feet of vein is opened, and worked in a suitable manner? Great, indeed, will be the measure of prosperity which will flow to this company when the improvements now under way are completed. Imaginative powers have not been called into requisition here for the purpose of misleading anybody, or for placing on paper aught that cannot be borne out by facts. These are just as I have given them, without colouring or exaggeration of any kind, having no object in view or interest to subserve other than the desire to correctly inform my friends, both at home and here, of the truth in relation to this valuable mining enterprise, which from present appearances promises to eclipse anything of the sort in Eastern Nevada, outside of the Richmond, at Eureka. Even this now famous bullion producer will, I have no doubt, in good time be left far behind in the race for precedence. The Tybo Company is yet in its infancy, but when it attains to matured age, and dons the habiliments of manhood, it will rank among the most important in this section of the State. Its property is valuable, and every day now will add to its merits; and time will, I am confident, prove it to be wondrously rich in the amount and quality of its ore, of which, should there be no further developments made, there is enough in sight now to run a 20-stamp mill and a couple of furnaces for the next 18 months or two years. A fact! Time will demonstrate the accuracy of my assertions.

Tybo, Nevada, Jan. 5.

J. D. POWER.

#### EXTRACTION OF METALS FROM THEIR ORES.

SIR.—From your numerous correspondents, it is evident that great interest is justly taken in any process which claims to aid the extraction of metals from their ores; and it may not, therefore, be uninteresting to you and your many readers to learn that a joint patent, taken out by my friend, Mr. Edward Smith, F.C.S., of this place, and myself will shortly be sealed. It is the result of a series of very careful microscopical, chemical, and mechanical researches and experiments, extending over a lengthened period, and we believe it will prove exhaustive so far as silver, copper, tin, and the desilvering of lead are concerned. As the printed specifications will, however, be so soon open to the criticisms of yourself and your readers, we need scarcely say more at present than express our belief that the chemical portion of our patent will be found indisputable, and that, as to the mechanical apparatus—the drawings having passed the judgment of competent engineers—a machine is being constructed for one of our tin mines with all possible speed, when its merits or its fallacies will be fully tested. The joint patent is an extension of one just completed by myself, and I will take care that copies of both are forwarded to you as soon as they come from the printer's hands.

Torquay, Jan. 27.

THOMAS CLARKE, M.D.

#### IRON ORE IN AUSTRALIA, &c.

SIR.—In a recent letter to your valuable Journal on the Tin Mines of Australia I mentioned the iron deposits of Tasmania, and I would ask a small space to say something in reference to the iron deposits of Australia generally. It is widely spread and heavily deposited over nearly all the continent of Australia, as well as New Zealand and Tasmania. Victoria shows it in abundance and of good quality in many districts, particularly at Sal Sal, near Ballarat, in the vicinity of Geelong, and in Gipps Land. New South Wales also abounds in it, and at Fitzroy, in the Goulbourne district, on the Southern Railway line, a very fine ironworks was erected some years since to smelt the ore found most plentifully in the neighbourhood, "a fine coal deposit being also in the immediate vicinity," but owing to faulty management was shut up shortly after being opened. Queensland also has some large and splendid deposits of this mineral, none of which have as yet attracted attention, with the exception of one near Toowoomba, on Darling Downs. In South Australia it is most plentiful, particularly in the Barrier Ranges, and all the mountain ranges leading up to them from the coast line; they have lately had a successful smelting of this mineral in Adelaide. I have travelled over all the foregoing colonies, as well as Tasmania, and may safely say there is hardly any country in the world more bountifully supplied with this most useful mineral. In New Zealand there seems to be any quantity of very superior iron ore, particularly near Masacre Bay, where the Para Para Company have a valuable deposit of the mineral in close proximity to a splendid seam of coal too. In Tasmania, on the banks of the River Tamar, there is one of the finest deposits of iron to be found in any part of the world, both for quantity and quality; in this deposit two companies have been making feeble efforts for some time past to manufacture the ore into marketable iron. On the Penguin Creek, the Blyth river, and other places along the north-west coast of the islands, iron ore of first-class quality exists in large quantities.

Having said thus much about our iron deposits, I will now point out some of the difficulties in the way of working them profitably. In the first place the quality of the iron is too good for our present great requirements (water pipes), it is quite unsuitable for making

such castings. Labour is dear and chiefly inexperienced, coal is high priced, and these, along with the amount of bad management displayed in nearly all such undertakings, precludes the possibility of sending it to England in the shape of pig-iron with any hope of profitably competing with the English produced in its own markets. A great drawback to the development of the iron deposits of Tasmania and Victoria is the unsuitableness of the coal deposits of the former for smelting purposes, and the absence of any coal deposits in the latter colony. No doubt the iron of these colonies is most suitable for the manufacture of first-class bar-iron, Swedish iron, and steel, and any company having sufficient capital to go into it largely, and who would supply all the plant necessary to carry out such a manufacture, could make it pay handsomely; they could command the markets of almost the whole Eastern world, and as India, China, Japan, and our island continent, as well as New Zealand and Tasmania, are fast extending their railways, such would be no inconsiderable trade in the first instance, and will eventually grow into one of vast proportions.

Scott's Hotel, Melbourne, Dec. 3.

ANDREW GEO. ENGLISH,

Mining Engineer, &c.

#### THE MANUFACTURE OF ARSENIC.

SIR.—To those who are unacquainted with the comparative harmlessness of the manufacture of this great mercantile commodity the report of the Rivers Pollution Commissioners probably appears not a little disconcerting, and the immediate appointment of a special Government Inspector also probably seems a matter of absolute necessity. It should, however, be borne in mind that the quantity of water used in these works is at all times exceedingly small, consequently no great amount of scientific supervision is required to save the rivers from harm. A very simple and inexpensive means of precaution is sufficient to effect this object, and when it is remembered that not a single fatal accident has occurred in connection with any of the works in the West of England since their establishment, the danger in other respects cannot be great.

Your special correspondent in Cornwall referring to the extent of the manufacture, and to the fear-exciting report of the Commissioners, very properly checks unnecessary apprehension by remarking that "the surprise is natural, but the alarm is groundless." To any reasonable Government inspection the proprietors will doubtless raise no objection; there being, however, only a very few works of the kind in the kingdom it would be well, perhaps, to consider whether the local Sanitary Inspectors might not be considered competent to undertake the duties; their remuneration altogether would not probably exceed the necessary travelling expenses of a specially appointed Government Inspector.

Pending any appointment that may ultimately be decided upon, the manufacturers themselves, in the protection of their own interests, will in all probability prefer co-operating with each other rather than trusting to isolated action. In the present instance there would seem to be no special need on the part of anyone personally interested in this branch of commerce to be seeking Government supervision through the medium of the press; this is sure to come in due course, as well as the usual taxation which seldom fails to follow pretty closely in its wake.

Jan. 26.

OBSERVER.

#### REMARKS ON THE ORIGINAL CORRESPONDENCE IN THE SUPPLEMENT TO LAST WEEK'S "MINING JOURNAL."

SIR.—Mr. Richard Meade gives us a very valuable paper on "The Iron Industries of Cumberland;" the giving us correct information on his important subject appearing to be the principal object of the writer. It would have been better if so much could have been said of the writer of the following paper on "Mining in the Pacific States;" which although giving to some extent good information, is greatly marred in its effect by the very evident prejudice of the writer against the only class of men who have hitherto proved capable of detecting the tricks of the American mining sharp or expert, or whatever he chooses to call himself. The Cornish mine captain whom he so much maligns is a man of extended and very varied experience, who if he hails from Redruth or its neighbourhood has the advantage before setting out of having been to some extent informed of the nefarious tricks sometimes practised by the tricksters in the Pacific States. His power of running a drift or sinking a shaft without vicarious aid will here serve him to some purpose in a salted mine, and enable him to protect the interests of his employers more effectively than the power of writing A.M., Ph.D. after his name. The letter on the same subject by Mr. J. D. Power gives us a more correct idea of the true state of things, and more correctly points out the abuses we have so much to deplore.

The following letters on "Tecoma" and on "Flagstaff" both proclaim the same old, old story, which seems to apply to a great number of people and a great number of mines in these regions—trickery, abuse, and robbery. The letters on "Mining in New South Wales" and "Mining in Queensland" seem to show a country extremely prolific in minerals. We think the promoters of the development of the minerals of those regions will best promote this object and preserve their own honour by carefully giving us correct information on the matter, and by assisting us in guarding against a similar race of mining experts as has been developed by the mineral deposits of the Pacific States. Hence we have all reliable information on this subject, and have read the letters of Mr. R. Adams and "Resident" with much interest.

"The Nascent Process." We shall be glad if this process will achieve all its promoters claim for it, but as it has only yet led to a very large outlay of money must await the result with some anxiety. "A Lenden Twelfth Cake," "Asbestos's" sketch is rather amusing, and cleverly written.

"L." gives us some good notions on "Utilising Tin Refuse," "Successful and Unsuccessful Mining;" Mr. Edward Skewis appears to be a man who is dissatisfied with everything coming before him. Query, Is he dissatisfied with himself? Such letters as this and his former letters lack the only quality which could possibly have rendered them of any value—the quality of justice and truth. He evidently looks at all things with a jaundiced eye. "Cornishman" takes a just and T. H. Allen an unjust view of the same subject.

We must leave promoters of their own mines to speak for themselves, such letters having no public interest. "Wheal Mary:" Report says that a great deal of money was made there by someone; and, indeed, it would seem so, for the mine has not been worked, and therefore, could not have produced profits to anybody. Let the mine be fully developed by a new company, then the truth as to its reputed value will be known.

"West Seton, and other Mines:" "A Silent Adventurer" appears to think that mines never ought to stop. We have no doubt the stopping of the mines along this run will prove of more advantage to the shareholders therein than their working would have proved, and that ought after all, to be the principal question. We do not see the advantage of propping up great losing mines while there is plenty of mineral in the world for all our uses, and which can be wrought at a profit. In future centuries, when it becomes necessary to get out the mineral from those expensive mines, we have no doubt there will be not only a cheaper and easier way of getting out the water, with good machinery for getting out the rock, but more liberal and enlightened lords or mining laws—we do not care which—so that together there may be some chance of those now considered men who supply the money getting fair return.

We turn with pleasure to those instructive papers, "Mining and Smelting in Sarawak," and the Extracts from Professor Ramsay's Lecture, both of which commend themselves to the mining student.

We have no sympathy whatever with those alarmists who are so much struck with the quantity of arsenic in store at Devon Consols. When they calculate that there is enough to kill every living thing on the face of the earth, we suppose they forget that it is rather unlikely that all this arsenic can be got into the stomachs of every living thing, and without which they could not be killed by it. We think they might be equally struck with the fact that there is water enough in the sea to destroy every living thing on the face of the earth, and in the moon too. When George III., King of England, went to view a large brewery, he was much struck by a thought of what a long distance the barrels would reach, and we think this

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SIR.—Th omits to st proved to b the future assay, will they posse arsenic, an the assay above refe identificat 100,000 ton and assort the comp course, de the conseq values. London.

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thought equally scientific with the others. We trust that fate, or a kind Providence, or Disraeli, will save us from all legislation which can be recommended by such a set of commissioners who could put forward that striking remark.

READERS OF THE "MINING JOURNAL."

#### THE WEST OF ENGLAND FIRE-CLAY, BITUMEN, AND CHYMICAL COMPANY.

SIR.—In an article on the West of England Fire-Clay, Bitumen, and Chymical Company, published in the *Mining Journal* of Jan. 16, reference is made to "an ingenious calculation of the comparative value of Spanish and arsenical pyrites." On referring to the prospectus of the company I find that the calculation, although undoubtedly ingenious, is to a considerable extent based upon false premises. In the first place the value of Spanish pyrites is represented as being increased 1s. per ton on account of 47 per cent. of arsenic which it contains. So far from this being the case, those manufacturers who employ this ore would willingly pay that amount for the elimination of the arsenic, which not only deteriorates the sulphuric acid, but also injures the quality of the copper produced from such ores.

The sulphur in the Cornish arsenical ores is next compared in value with that present in Spanish pyrites; it should, however, be remembered that no ore containing so little as 18.10 per cent. of sulphur has hitherto been profitably treated for the manufacture of vitriol, and that large quantities of Irish ore, containing considerably more than that percentage, are quite unsaleable. The comparatively small quantity of iron present in Cornish arsenical pyrites is calculated at the same price per unit as that contained in Spanish ore, whereas it is well known to the trade that an ore containing as much as 17 per cent. of silica, and only 29.52 per cent. of iron, would yield (after the extraction of sulphur, arsenic, and copper) a residue which would be entirely valueless as an ore of iron.

It will appear to anyone acquainted with tin dressing very doubtful if 0.8 per cent. of tin, valued at 1s. 6d., could be extracted from a ton of ore without an expenditure considerably in excess of 1s. 6d. The statement that the cost of treatment of the two ores in question (Cornish and Spanish) would be practically equal scarcely requires comment when the relative cost of fuel in the two districts is considered.—*Widnes Metal Works, Jan. 25.*

A. G. P.

#### THE WEST OF ENGLAND FIRE-CLAY, BITUMEN, AND CHYMICAL COMPANY.

SIR.—The prospectus now being issued by the above company omits to state the proved assay of the 100,000 tons of ore already proved to be available on the Wheal Newton mineral estate. As the future prospects of the company so largely depend upon this assay, will the directors be good enough to make public the evidence they possess of the actual assay of the proved 100,000 tons for copper, arsenic, and silver. There is nothing in the prospectus to identify the assay which is therein published with the 100,000 tons of ore above referred to. From the analysis given I should infer that such identification does not in fact exist. What, then, is the assay of the 100,000 tons in bulk, and what amount of ore will have to be broken and assayed so as to produce 1500 tons monthly to be treated by the company, as set forth in the prospectus? Upon this point, of course, depends the cost price of the raw ore to the company, and the consequent margin for profit in the extraction of the several values.

A SHAREHOLDER IN CORNISH MINES.

London, Jan. 26.

#### SUCCESSFUL AND UNSUCCESSFUL MINING—No. IV.

NOT SUFFICIENT WORK CONTRACTED FOR.

SIR.—It is well known that in almost every mine there are certain parties who are paid by the day's work, not in proportion to the work, but according to the number of days. The writer reluctantly submits the following facts to public gaze, as they have all occurred within the last three or four years, and have had anything but a beneficial influence on the respective mines, as will be shown subsequently. In No. 1 mine three men and a boy were daily tasked with the labour of filling five loads of stones, each containing 30 cwt., from an old engine-house previously thrown down, and on one or two occasions the agent told the men they need not help to fill the cart unless loading it with large stones; so what the men were to do they really did not know, as replenishing the cart was their principal, if not their only, work, next to playing draughts. Underground work in the mine was a little more satisfactory, as the agent told the men that if they worked well he would see they were well paid, and the men every time they heard the agent's footsteps would ignite a bag containing powder, and immerse it in the water, that it might cause more smoke. Then do you wonder that it costs the adventurers about 6000*l.* to develop about 70 fathoms of soft ground in shafts, winzes, and levels, the deepest part of the mine being only 20 fathoms below adit? In No. 2 mine four first-class men, with a pitman to superintend, and an agent in daily attendance, were seven days in fixing a ladder-way in a small adit shaft 18 fms. deep. Again, the drawing of 50 kibbles, by two men, from an adit shaft 17 fathoms deep, in eight hours, was considered above mediocrity. Are you astonished when informed of the fact that the mine, after squandering more than 12,000*l.*, should be voluntarily wound up without seeing the bottom of the shaft? In No. 3 mine the masons were paid 9s. 6d. a perch for all the masonry built on the mine—everything brought to their hands—and had to provide nothing but their tools; the agent said, after measuring the work, "I am ashamed to tell you what it costs per perch to build, but I really could not help it." Then the mine, after expending several thousands of pounds to drain 20 fms. of water, succumbed to the depression then and now existing. I could give such cases *ad infinitum*, but you ask—To whom is the blame attributable? I reply—Not the workmen, as it is an inherent principle in men to prefer idleness to unceasing labour, unless sweetened by the more than ordinary "hope of reward." In visiting a mine, a few days since, on the banks of the Tamar, I saw that everything was being done with an energy exemplary in every department. Here were no men searching for labour that required no toil; here were none of that class who are conspicuous for their absence when work is being done; here was none of the dockyard skill—"three men to a brick"—but the manner in which men even moved to and fro on the mine was most commendable. The agent told us everything was being done by contract, both at surface and underground, even the drawing by steam power at so much per 100 kibbles or skips.

"Cornishman" says, in his criticism on my letter, "In contrasting the difference between the mine dressing-floors and streamer dressing-floors, he appears to forget that in mines the stuff has to be stamped, and that buddling was necessary in order to catch the rough tin, none of which is necessary in stream works." Does "Cornishman" recollect my stating, when comparing the disparity, "Which tin the mine could not render marketable on account of the complicated machinery used in its extraction." The wild infatuation of youth would lead one to ask "Cornishman"—Who knows most about streaming—himself, or the whole class combined? If his theory is right, the first eight companies of a possible nine on the Red River must have erred, and are still erring, egregiously, as they use either steam or water stamps. But I forbear interrogating him with legions of such questions, as an important subject, and not an individual, has my attention. Again, "Cornishman" says—"The idea of agents or captains keeping a pack of hounds is ridiculous, preposterous, and more than this, untrue." Granted, it may be the first two premises, but "truth is always stranger than fiction." When I first started to write on this subject I formed a resolution not to mention the name of any mine or person, and, if any of the facts were doubted, would give the parties, on receipt of their address, the why, wherefore, and whereabouts, &c., of the whole transaction. To vindicate myself from the imputation cast, I would state that, if "Cornishman" chooses, I will show him the place where the kennel stood, and could point him to the course which the hounds generally used to take weekly. Moreover, the agent kept a badger in the mine, which used to afford sport every alternate day about 30 years ago. If "Cornishman" still doubt I am afraid

"he will not be persuaded though one rose from the dead," but I will, nevertheless, give him all the information needed.

EDWARD SKEWIS.

Moore Farm, Plympton St. Mary, Devon, Jan. 26.

#### SUCCESSFUL AND UNSUCCESSFUL MINING.

SIR.—We have lately been entertained with a series of articles in the *Mining Journal* under the above caption, and as no examples are furnished in an intelligible form to enable us to distinguish between the course which should be pursued to secure success in mining, and avoid the opposite, it is difficult to perceive with what motives, and to what purpose, these letters have been written. If the writers' intentions were to display their knowledge upon the subjects upon which they write, and they entertained the slightest hope of bringing honour to themselves, I think I risk nothing in predicting their signal failure. The letters bear the stamp of entire juvenility and inexperience, and know-nothingness of the subjects upon which they have essayed to write. It appears to me that when persons voluntarily undertake to enlighten others upon a subject so comprehensive, intricate, and many-sided as practical mining, both as to its natural constitution and manifold detail, that they should be provided with something more potent, respectable, and persuasive than dirt, otherwise an object so ambitious and likewise meritorious can never be accomplished. The style of writing of two at least of the writers in the Supplement of last week's *Journal* leads me to suspect that they are emanations from the Miners' Association of Cornwall; and if this supposition is correct, may I be allowed to ask if this is the kind of fruit which that institution is likely to produce in general? And if these are fair specimens of its erudition and accomplishments, what is to become of mining? I see nothing in the letters which may not be summed up in the one sentence—Childish, petulant envy. I thought we had passed that stage in our social and intellectual advancement when the weight of evil was sought to be lessened by the substitution of other evils no less baleful, pernicious, and fatal to the purposes they were intended to subserve. It would almost seem as if the world occasionally took a reel backward, and that in thus rebounding it brings to the surface some social excrecence which aforesaid mingled with the undergrowth, and which, by its sudden change of position and destitution of roots, evinces a vapourising tendency to soar to still higher regions.

Whatever deficiencies may be alleged against Cornish mine managers, of this we may rest assured that the writers of these letters are not qualified to supersede them. I would like to ask that light so suddenly sprung up on Camborne Beacon what relation he supposes there exists between a knowledge of the component parts of zinc-blende and practical mining? Would that important information enable one to extract it from the mine at a less cost, and at a proportionately greater profit to his employer. Perhaps that luminary from such an eminence may be able to enlighten us upon this question. Knowledge in the abstract is not power. It is the knowledge of its proper application which can alone make it so. Many men's knowledge is to them a source of weakness. It is like crowding heavy sails in a gale of wind on a rotten mast. If knowledge has not a philosophical substratum with prudence as its helm, but consists merely in the letter, the possessor, with whatever pretensions, can at best be but a literary harlequin.

I think Mr. E. Skewis stated in a letter recently published in the Supplement to the *Journal* that he was not an agent. I should like to ask if he has ever been; and if he was, and is not, what is the reason? His career, if he has one, must have been of short duration, but it is just possible that with his superior intellectual endowments and acquisitions that it was difficult for him to realise a competence, especially as his competitors in the field have been compared to dead men.

I presume the reason why these censorious scribes have not been extinguished by some of the heavier weights in the neighbourhood is that they consider them too insignificant and puerile to specially merit an extinguisher. Well that certainly is a distinction, although without merit.

EX NIHILO NIHI FIT.

#### SUCCESSFUL AND UNSUCCESSFUL MINING.

SIR.—I must again ask you to favour me by publishing a letter (for the present, I hope, the last on the above subject) for the enlightenment of Mr. T. H. Allen (in reference to his letter in last week's *Journal*), and the public at large. In the most vigorous, graphic, and concise language he epitomises my reasons or causes, as embodied in a previous letter, and then, without attempting to refute anything, he scatters all my assumptions and conclusions to the winds, as wondering why any sane man could give credence to such thoughts, by declaring in a few forcible sentences that the great secret lies in these three magic words—"unqualified mine agents."

That this is to a certain extent the case I know, but that it is the essential cause of failure, as Mr. Allen says, I do most emphatically deny. The mere fact of a mine agent not knowing the chemical composition of blende does not prove that he, in his position, was inefficient. Every metallic substance raised from our mines may be saleable, but the grand question is, would that sale be attended with profit? Mr. Allen's letter reminds me of a so-called speech made by a leading Good Templar, in which he stated that some of our legislators at times made their appearance in Parliament in a very "elevated" condition, then in a tone of sublime declamation he thundered, "Men like 'they' should be turned out, and men like 'we' (sic) sent up there instead." Science is advancing, and scientific men are at a premium, and perhaps old agents can be told much that is new to them by younger men. Perhaps public competition for vacant mine agencies would ensure a better class of men, but in that case ordinary young men who had studied but superficially would be nowhere in the race for advancement, and the remedy would, to them, be worse than the disease. No young man in this age should rest for an inducement to study, for the world is ample for the gratification of all the ambition of these "pushing, energetic young men," who, if they found their talents unappreciated at home, would be received with open arms in Mexico, the United States, Chili, and, indeed, all civilised new countries where there is an ample arena for the exercise of all the energy, skill, and scientific attainments of pushing, agreeable, sociable fellows who know the value, commercially, of all the minerals, and can give a valuable hint to their superiors, and take one now and then from their inferiors in social position. This is a free country, and every man who falls fatheth to himself,—each one who lifts himself above his sphere, is not his the credit? Merit is not to be hid under a bushel, and, like water, every individual man must find and keep his level.

Jan. 28.

A CORNISHMAN.

#### CLEE HILL COLLIERY COMPANY.

SIR.—After two weary years of tolerably patient waiting for dividends, I was somewhat surprised, not to say annoyed, at receiving the directors' report containing an intimation that more money was wanted. I thought, however, that if our colliery was all that it was represented to be, a point upon which perhaps I may be excused for having entertained considerable doubts, it would be a pity to let it languish for want of means to make it successful, but at the same time I was not at all disposed to throw good money after bad, so I made up my mind to go down to the meeting and have a good look at the place, and to decide on the spot whether I would subscribe for some of the proposed new capital or not. So on Thursday last I booked for Ludlow, taking the precaution to pay for an insurance ticket, so as to surround my search after knowledge with all possible safeguard, and in due time I arrived at the old town. Being a good pedestrian, and anxious to spend as much time as possible on the field of inspection, I started after breakfast on Friday and walked up to the top of a very high hill—Clee Hill—and I then found myself on our property. I went quickly about poking my nose into everything, enquiring when I had a chance (for I saw very few who were not busily engaged) as to what was going on, and every now and then enjoying the magnificent panoramic view which was to be gained from where I stood, and whether it was the fresh frosty crispness of the air and the brilliant sun, or whatever was the cause, I felt myself rapidly drifting out of my discontented mood prepared to make excuses to myself for the grave

omission on the part of our directors in not paying us handsome dividends, and moreover hopes began to rise that we should make something out of the place after all; in fact, I was in a happy frame of mind, but still the idea stuck to me that with a good property, such as that which lay before me, we ought to have done better than we have done. So although rather tired with my six miles walk I trudged on, visiting one spot after another, and putting subtle questions to all the workmen I met, and at last after turning into a roadside inn, I went to the local office and attended the meeting. I listened to the speech made by Mr. Thompson, and thought to myself that had I been in his place, with such a subject to deal with as the Clee Hill Colliery, I could conscientiously have put a better colour on things than he did. However, Chairmen's speeches have so much of the *couleur de rose* about them that a plain unvarnished statement of facts is a fault on the right side, and I determined to trust some more money in the hands of gentlemen who evidently did not seek to mislead me. I am afraid I have already trespassed too much on your valuable space, or I would give some details for the benefit of your readers of the various parts of the colliery, but you will perhaps allow me to add this only, that although I found the journey a somewhat fatiguing one, I was thoroughly pleased with my visit.

A CONTENTED SHAREHOLDER.

#### WELSH MINING—THE NASCENT PROCESS.

SIR.—Having seen such reports in the *Journal* concerning the Nascant Process on low-class ores, allowing one-half to be correct, as reported, there is need to welcome the patentee for his perseverance and abilities in bringing it to such perfection, and offering it to the world at large at low royalties. It has been a great oversight for an indefinite period to treat at mines for one or two minerals only, the remaining rock which contains other minerals going for waste (references to North Wales). It would be a welcome visit if such men as Dr. Emmens did really go for a week to the neighbourhood of Dolgelly, as he or they would have such favourable prospects presented to them from every side as to send them back to London to get the desired capital. Confidential agents can be sent to collect samples and report on the vast wealth which abounds almost on all sides of Dolgelly. Again, some will say there have been so many trials made to work the mines, and all proved failures, that it is useless to attempt it again; but such opinions are needless. Companies must begin to work at the right place, as all the mines have spent the money in erecting machinery, instead of prospecting the mine.

Companies when formed get some practical men to report on the mine, and who at a hasty glance give very good reports, but being limited to time pick up good samples and get them assayed, and as is often the case, the reports are wonderful. Then follows the death shot. The company, certain of such wonderful profits, commission some one to order a lot of extensive machinery, not even knowing the class of machinery required for the treatment of the mineral—erects it at great expense, makes a permanent establishment at surface, and then follows a trial of machinery which is not capable of extracting the metals which it was intended to do. Then other paid agents are called to the rescue, and, as a matter of course, have their own ideas, give them freely in their reports, introduce other machinery, oftentimes erected with like results. Then comes the turn of the tide. Capital being expended, a suspension of works follows (such has been Welsh mining). If an intelligent agent be sent to report, he will enquire the number of men employed on the mine, "have you good prospects," also "good reserves," the supposed amount at the dump, and many other questions; but to his surprise he will have very lame answers. They will say the mines are not prospected as they ought to be, all the available force having to work at surface, and little has been done underground, having no room for men if allowed to put them on. Such way of working is not mining. As a suggestion, the best way considered is to explore the mine thoroughly, to get good rock at the dump, also some reserves, erect temporary machinery, do but as little work as possible at surface until it is proved to be required, find the class of machinery most suitable for the mineral, and erect permanent machinery.

Now, as arsenic and sulphur are great commercial articles, and very valuable when lead, blende, copper, and gold are associated with them, if investors were to turn their attention to such valuable lodes as can be worked near Dolgelly to advantage—solid lodes, from 3 ft. to 9 ft. wide, situated in the side of the hill, drive a level on the course of the lode, then work from the backs, plenty of water to be had from the river to drive the machinery to crush the mineral, being within easy distance from the railroad, where coals can be had reasonable—such advantages ought not to pass enterprising capitalists. Allowing that companies even from abroad send their pyrites and sulphurets to Swansea to be treated at a profit to the parties concerned, ought such rich minerals to remain before our eyes even at surface, and causing us to envy the owners in not inviting gentlemen to see such properties?

Allowing the Nascant Process to gain golden opinions at Calstock, why not establish another such important branch in North Wales? Thousands of tons of mineral can be got, and the universal topic is if sulphurets and pyrites can pay anywhere, it will certainly do so here. Gold mining is also carried on, but not extensively; foremost is the Clouan Gold Company (Limited), worked by a few enterprising gentlemen, treating about 2 tons of mineral per week, and I hear paying the cost. Great judgment has been shown to develop the mine, and to get the best machinery to extract the gold. This has the appearance of a lasting mine, but so many having burnt their fingers in erecting such expensive machinery, those gentlemen are afraid of the fire.

VISITOR.

#### THE GREAT SNOWDEN MOUNTAIN COPPER MINES.

SIR.—Will you do me the favour to correct an error which has appeared in your report of the meeting of this company, in which I am made to say that "the halvans were five times the value of those at the Parys Mountain Mine?" As persons who are not acquainted with the two mines may draw a wrong inference, or may assume I was speaking of the value of the bulk of the halvans in each mine, I wish to say that my remarks regarding them were as follows:—"At the Parys Mine some years ago, the Messrs. Taylor, I believe, treated profitably many thousands of tons of the halvans there yielding only about 1 per cent., whereas the halvans at the Snowden Mines, at a cost of 6s. per ton for selection, were estimated at 2½ per cent." It will be seen that I was speaking of a percentage of the halvans, and not of the value of the bulk, as I presume the accumulation at the Parys Mine would be something enormous, and, of course, considerably more than at the Snowden Mines.

Bangor, Jan. 27.

EDMUND SPARGO.

P.S.—Since writing the above, I learn from the manager of the Parys Mines that their halvans will yield from 1½ to 1¾ per cent.

#### WHEAL MARY TIN MINE—ST. DENNIS.

SIR.—I have no objection to Mr. Thompson and Capt. Parkyn squabbling if they choose, but I do object to Capt. Parkyn stating that his opinions and reports were borne out by any report of mine. When I inspected Wheal Mary there was some tin found in the bottom of a clay-pit, and in some other pits, along the back of a kind of elvan course, where some of the stones gave a very high produce. I recommended a shallow trial by a small steam-engine for pumping and stamping, and if this course had been adopted the mine would have been proved by the time Capt. Parkyn had got his big engine to work. This was long before Capt. Parkyn had published his wonderful "save-all" dressing-floors, or had commenced those extraordinary reports of the wonderful discoveries he was almost daily making there; after which I never went near the mine, nor wrote anything concerning it, consequently could not have borne out his reports. The manner in which the shareholders in this mine have been treated by the executive may commend itself to Capt. Parkyn's conscience—different men may sometimes take different views of things.

WM. TREGAVY.

#### GREAT ROYALTON MINE.

SIR.—It is now over two years ago that Mr. W. J. Thompson, who at that time had an office in the Strand, London, was appointed liquidator, and he made a call on us shareholders of 2s. per share, and, no doubt, collected nearly all the calls—at least, all the largest shareholders paid. I am one of the largest, and I paid my



call at once; the liquidator then sold the engine and stamps, &c.—in fact, all and everything on the mine for 1400*l.*, and we have not yet got any account of what has been done with the money. One thing I know is that the debt of the mine have not been paid, and proceedings have been taken against him in the Star Chamber Court. I hope the late shareholders will at once convene a meeting with a view of settling the affairs of the company. — A LARGE SHAREHOLDER.

### ROMAN GRAVELS.

SIR,—With reference to your correspondent's letter, signed "Investor," on this mine, an observation or two crop up which appear not to have been noticed in his however very practical and favourable opinion of this property. In the 20 productive stopes of this mine, named by him, we find that the total mine value of the stopes is represented by the sum of 146*l.*, giving a value to every stope of 5*l.* and a fraction. In most mines 1*l.*, 1*l.*, or 2*l.* are considered to be a very fair medium value indeed. What British mine on the market (except Van) touches the value of Roman Gravel?—5*l.* for every fathom dug out! (I include in this calculation the 80 fms. south of Corfield's shaft, now worth 8*l.* instead of 5*l.*.) Now, in the 507,000*l.* of reserves, named by Capt. Waters as in the mine, it is found that at least 200,000*l.* are clear profit; for at the last meeting, in February, 30,031*l.* 14*s.* worth of ore produced 16,832*l.* 7*s.* 2*d.* net profit. The value of lead, however, having increased since that period in last year, we may safely presume that these figures understate the profits per ton at this time. Lead mines are declared in Wales to be getting scarce. At 13*l.* Roman Gravel ought to be (without doubt) the finest investment extant, especially when we consider it is an English property, well managed, without the detestable uncertainty of foreign concerns, however good, and within a few hours' ride of a man's own fire-side, and paying large interest. An opinion by Capt. Waters would be worth great weight at this time if shareholders should entertain doubts of the enormous value of this splendid mine.

London, Jan. 20.

P.S.—There is no question but a highly satisfactory state of affairs will be published at the coming quarterly meeting. Roman Gravel will only become fully developed in 50 fms. deeper driving, despite its present enormous tangible wealth and returns.

### THE FLAGSTAFF MINING COMPANY.

SIR,—I was much pleased to see a statement in last week's Journal that it is possible legal proceedings will be immediately commenced against those associated with the early conduct of the affairs of the Flagstaff Company. When I consider that one of the Articles of Association was that "no dividend should be paid except out of profits," whereas the directors, with borrowing powers to the extent of 10,000*l.*, should be allowed with impunity to borrow 80,000*l.* to pay dividends, for what reason they, of course, know, I have been perfectly amazed, and would willingly contribute towards a fund to try the legality and responsibility of their action. Several months ago, when a Mr. White was chairman, I contributed towards a special fund for some particular purpose, but since then I have been unable to find out what has been done with the money so subscribed. Mr. White, being no longer chairman, referred me to the secretary of the company. I sincerely trust the hopes raised by the paragraph in last week's Journal may soon be substantially realised by prompt and vigorous action in the way therein indicated.

Plymouth, Jan. 21.

W. LEWIS.

### JAVALI MINE.

SIR,—In answer to your correspondent, signed "A Puzzled Shareholder," I may state that I have been equally surprised as to the quotation of Javali Mine. For about 18 months past I have carefully watched the returns of this mine as from time to time they have appeared in the Mining Journal, and on averaging the profits of 12 advices from Capt. Sohns I find that 500*l.* per month is about the sum, some of the returns being enormous. With 22,500 shares I buy the mine (at 7*s.* per share) for 7700*l.*, cash in hand, machinery, &c., all included. Surely an oversight on the part of the investing public, especially your correspondent, who, I am sure, Capt. Sohns (the manager) has purchased 300 shares at a higher figure than the present nominal quotation, coupled with the statement he made at a public meeting, that the "mine was as good as St. John del Rey." Abundant labour is always attainable, not a certainty in foreign adventures, but an important consideration. The present capital is very small indeed, and weighted with a very few debentures taken up. The surface deposits of dirt are of great extent, and the yield of gold per ton far exceeds Port Phillip, and other foreign gold mines, being always 6*s.* 4 to 10*s.* 4*d.* per ton, and is, moreover, under excellent management—that of a practical man like Capt. Sohns. But the returns at the very low figure of 300*l.* per month, and we have 3600*l.* per annum as the result—say, 3000*l.* per annum—on 7700*l.* capital. This is taking the gloomiest view of the Javali Mine into consideration. The returns I believe henceforth are pretty certain to average 600*l.* per month profit, and then we shall find 7200*l.* per annum available for dividends. Javali is now emerging from its embryonic condition to become a famous gold-yielding enterprise, and by mere chance has been overlooked. Capt. Sohns has overcome all difficulties, and ended by leaving his savings where he believes they will return him large profits—in his own gold mine.

London, Jan. 25.

### JAVALI MINE.

SIR,—In judging the value of a mine, English or foreign, we form an opinion of its value by the returns made. This property has shown a profit of at least 4500*l.* per month, on an average. Your correspondent, "Puzzled Shareholder," states that only 22,500 shares are issued, hence we have a mine returning at least 4500*l.* per annum, on a capital of 90,000*l.* (say), if we call the shares but 8*s.*, besides a few debentures. The mine is attracting attention, for transactions in the shares have become more numerous, and at better prices. One report, about a year since, calls attention, showing what the mine can do, and how tremendously powerful the machinery must be. The yield of gold was valued at 1060*l.*, from 1500 tons, 1300 tons being taken from the surface deposits, which are found to improve in quality, and are of great extent. One more return last year (August) shows very marvellous results in only 23 days, giving 1385*l.* 16*s.* 2*d.*, from 1353 tons, showing a profit of 870*l.* 12*s.* 1*d.*; add one week's return, and we have just 1100*l.* profit for the month—that is, 13,200*l.* per annum if kept up for the year. The machinery is in good order. The singularly rich returns I name are taken from public print before me. Perhaps some shareholder can offer information as to the future prospects of the Javali Mine. A few debentures are issued, which are easily paid off with such a mine as Javali. It is a singular fact that the rich mine of St. John del Rey returns but 1*oz.* of gold to the ton (slightly over that amount just now), the lode being termed "The Mother Lode of Brazil," yet Javali returns nearly ½ *oz.* per ton always.—London, Jan. 26.

[For remainder of Original Correspondence, see to-day's Journal.]

**THE CAPE COPPER MINING COMPANY.**—Messrs. John Taylor and Sons, managers of the Cape Copper Mining Company, call attention to the following statements, which form a portion of Cape Copper News, dated Dec. 26, published in the Times of Saturday.—"The Cape Copper Mining Company is now sending to bank 900 tons of splendid ore every month. The new mines on the Orange river are indicating lodes of great mineral wealth and very pure ore." Messrs. Taylor add that the company's advice which they forwarded to us on the 11th inst. was as follows:—"The report of Ockleup continues very satisfactory. Those of Spectakel and the old Trial Mines show no material change. The trials at the Orange river centres have led to no discovery of ore, and the prospects there are not favourable." They remark that the two reports, as far as they relate to the Orange river mines, are quite contradictory, and that as later letters by the last steamer, the *Arcturion*, Dec. 26 in Cape Town, make no reference to the Orange river centres, it is evident that no material change in the prospects of those mines had occurred. Although their shareholders and the Stock Exchange have received the full report of the company's chief mining agent referred to in their summary, a copy of which they enclose, they think it well to write to us, as they think it possible that the paragraph which we have published might mislead the public by giving an improper value to the appearances of the Orange river trials.—Times.

**ARTIFICIAL FUEL.**—Mr. D. BARKER, of Northfleet, has patented some improvements in the construction of machinery for moulding and compressing artificial fuel and other substances. This invention relates to certain improvements upon an invention for improvements in the construction of machinery for moulding and compressing artificial fuel and other substances, and is described in Letters Patent, dated Nov. 22, 1873, No. 3813, was granted to William Barker. In working under the last-mentioned invention, it has been found that the pressure rolls or mould-wheels, which are employed for forcing the materials under treatment into the moulds, are liable to become clogged, and incapable of being rotated by reason of a larger quantity of the materials passing from the pug-mill above than is necessary to fill the moulds. This disadvantage is obviated by placing a filling pan in lieu of the pug-mill, from which the materials descend through a pipe or channel, the lower part of which has four solid oblique blocks attached thereto, which blocks forming a cone, the successive rotation of such a quantity of the materials as is sufficient to fill the moulds successively. Any superabundant materials escape at the lower part of the cavity, and a jet of steam is, when desired, projected thereon to soften the same and facilitate expulsion. Steam is also allowed to play upon the exterior of the moulds in order to cleanse the same.

**ROLLING METALS.**—Mr. S. WHITMAN, of the Calder Vale Iron-works, in Wakefield, has patented some improvements in machinery or apparatus for rolling iron, steel, and other metals, which invention relates more particularly to apparatus known as "three-high system," to be used for rolling iron, steel, or other metals into plates or sheets, though parts of it are also applicable to rolls generally. The invention consists—1. In the application of a spring or springs at the ends of both the middle and top roll, or at the end of the middle roll alone, so as to bear up and lift the said middle roll, and thereby prevent concussion when the metal sheet being rolled leaves the roll—2. In the application of hoops of iron, brass, steel, or other suitable metal on the ends of the rolls, so as to prevent breaking of the service of the rolls—3. In the application of a strap or chain for driving the top roll, especially in cases where the top roll cannot be connected with and driven by any other motive power, the said strap or chain working on the boxes from each end of the top and bottom rolls; and when a strap is used a weighted lever, with a pulley, is applied to take up the slackening of the strap—4. In making the framework or housing of the rolls closed, so as to have a solid mass of metal in the distance to the side of the neck of the rolls, whereby the lateral motion given to the middle roll is prevented, and side chocks are entirely dispensed with. The housing is also so constructed that the middle roll can be changed without removing the housing from its permanent position.

**UTILISING WASTE PRODUCTS.**—Mr. W. A. LYTTEL, of Hammer-smith, has patented an improved process for treating sewage, and for utilising certain products derived therefrom, which improvements are partly applicable to other purposes. The features of novelty are as follow:—1. The utilisation of the sedimentary matter or sludge of sewage in the smelting of iron, the carbonaceous matter and the silicates of the sludge being made to serve in various ways as auxiliary to the fuel and fluxing materials now employed—2. The consolidation of the dust or colliery dust of coal, or the dust of peat charcoal, by incorporating sludge with such dust, and then making the mixture into briquets for smelting fuel—3. The consolidation in the last-mentioned way of a mixture of crushed iron ore, lime, sand, powdered fuel, and sludge, so as to make a conglomerate, containing in itself all the materials of a smelting furnace charge—4. The filtration of the effluent water of sewage through a vortex filter, consisting of charcoal kept in slow movement by a pug-mill arrangement—5. The recovery of ammoniacal liquor from the exhausted charcoal of this filter by coking—6. The use of the charcoal, in the first instance, for filtering the drinking water supplied to a town before such charcoal is used for other purposes.

## Meetings of Public Companies.

### CLEE HILL COLLIERY COMPANY.

Ordinary and extraordinary meetings of shareholders were held at the colliery, near Ludlow, on Jan. 22.

Mr. THOMAS THOMPSON, jun., in the chair.

The SECRETARY read the notice convening the ordinary meeting, and the directors' report and accounts being taken as read, the following report from Capt. John Kitto was read:—

I certainly did hope to have the pleasure of meeting you on the present occasion when I should have had an opportunity of explaining to you more fully and satisfactorily than I possibly can do in writing the proceedings of the past, together with the present position and future prospects of the company's mines and works, but unfortunately a severe illness, which for the past week has confined me to my bed, precludes the possibility of my attending the meeting to-morrow. You will, however, be able to see at once, from the nature and extent of the property, that too much care could not possibly have been taken in the preliminary arrangements of this company's operations, and in selecting some of the best and most likely places, either by the re-opening of old pits or the sinking of new ones, with a view of securing a permanent and satisfactory output for the future, but instead of this being done our capital was unfortunately frittered away by jumping from place to place and from pit to pit near the outcrop of the coal, where no possible advantage could be obtained of a permanent character, and the end of such useless operations, as might naturally be expected, resulted in total failure. At the time I took the general superintendence of the company's works the whole of our capital had been spent without arriving at any satisfactory issue, and the only course open to me in order to save the company from utter ruin was to work quickly and cautiously, raising and selling as much coal as possible from pits then in use, and at the same time to sink and open others in different parts of the property, where large quantities of coal were known to exist; and with this view Nos. 1 and 8, together with the Church pit, were selected as the most likely places to supply a satisfactory return for the future, and I am pleased to say that, so far as our operations have extended, the result has been very satisfactory, and the prospect at present justifies the belief that we have discovered a large area of coal at each of the three pits named above, and from which we shall obtain a good output as soon as the engines referred to in the directors' report have been erected and set in motion for drawing the same to bank. I cannot conclude without expressing my fullest conviction that the property is yet to be made to pay a satisfactory dividend on the capital of the company at no distant date, but in order to accomplish this object it is absolutely necessary to provide funds for the further development of the works, and for a working balance, as nothing can be more damaging to the company's interests than to have to incur debts which they are unable to pay as they become due; or, on the other hand, to have to use undue pressure in collecting customers' accounts. I would, therefore, strongly urge the advisability of raising the additional capital recommended by the directors, and I believe that the sum mentioned by them—4000*l.*—will be ample for placing the company in a sound, safe, and profitable condition.—JOHN KITTO.

The CHAIRMAN said that before referring to the reports and accounts he would explain the reason for holding the meeting at the colliery instead of in London. Few of the shareholders lived near London, and he thought it was not inconvenient to the majority to fix upon the colliery for the meeting; and it was desirable to meet there, where there was the opportunity of inspecting the property, and obtaining information or explanations on any points suggested by the inspection. The shareholders present were now in a position to attach their proper value to the remarks he was about to make. The board had been as much deceived as were the shareholders by Mr. Bertram's promises, and all that was said by the directors at the last meeting was based upon the honest conviction that the colliery was capable of making the large returns which he promised. Mr. Cooper took his place, with excellent testimonials, and strongly recommended by some of the largest shareholders, and if he had proved all that was expected of him the colliery would be more prosperous now. But his management was not successful, and Captain Kitto had yielded to the urgent entreaties of the board, and had undertaken the management on the following terms:—He stipulated that when the concern was successful he should have 300*l.* per annum, out of which he would provide a resident manager on whom he could rely, but until its success was established the company should not pay anything beyond a small salary for resident manager. His brother was appointed by the board to that post at 120*l.* per annum, and Capt. Kitto now spent several days each week at the colliery. Under present management the cost of working had been much reduced, the men were contented, and there were very early prospects of a satisfactory output of coal. In Bertram's time better prices were obtained for the coal, and, therefore, if Captain Kitto had had the superintendence then, with his more economical working, good profits would have been made. But even at present reduced prices there was a good margin for profit as soon as the output was larger. The Chairman then said he had that morning been underground, and everywhere the results of improved management were apparent. Referring to the balance-sheet, some of the "Sundry creditors" had been paid since, but new liabilities had taken the place of the old ones. The "Plant account" comprised engines, horses, railway wagons, new pits, &c. There was a good supply of such things now, and there was no reason why much more money should be spent for plant. The amount placed against "Sundry debtors" was for coals, &c., sold, and would probably be larger in future balance-sheets as the output was increased, and the business thus enlarged. He did not anticipate any difficulty in always collecting accounts with tolerable regularity as the customers were all good ones. The "Expenditure and revenue account" required no explanation, for it was very simple. With regard to the assets, a portion of the amount due on capital account had since been received, and the stock of coal was worth more than the 600*l.* put down in the accounts. One other item ought to have appeared under this head—the stores in stock. It was not very easy to estimate their value at the time the balance-sheet was made up, and as there was no anxiety to make the accounts look better than they were the matter of stores was left out altogether; they would have made the accounts show a better result by over 150*l.* The portion of the Ddu Stone Quarry which was let produced over 300*l.* a-year already, and it was probable that a further piece of this ground would be let on advantageous terms. The brickyard would also probably be let soon; it had not been worked so much for profit as for supplying the company's requirements for brickwork, building, &c. It might, perhaps, have been worked profitably had more attention been devoted to it, but all energies had been directed to the coal. The limeworks had not been much worked for the same reason; they were at a distance of more than a mile from the office, and a check on the work, if carried on by the company, was almost or quite impossible. They had now been let, and good returns would be got from them. Under the Articles of Association two of the directors retired, and offered themselves for re-election, as did the auditor. The Chairman then moved the following resolution:—"That the reports of the directors and Captain Kitto, together with the accounts as audited, be received and adopted."

A SHAREHOLDER said that in seconding the resolution he wished to make a few remarks. He had invested his money in the company expecting to get early and large returns, and it had been a source of disappointment to him, and to many of his friends whom he had recommended to take shares, that they had no dividends. He was beginning to think there must be something wrong, when he received the notice of meeting, with the report and accounts, which he had carefully perused, with the result that his mind was reassured. He had known the property for years, and knew it was good. He determined to persevere in energy and zeal, and had been over the property that morning; and, having some knowledge of such matters, had weighed the probabilities of the future, and could endorse all that the Chairman and Capt. Kitto had said on that subject. After the opportunity they had had of seeing the whole of their property, and having its good and also its unfavourable features pointed out to them, and after paying careful attention to the full and clear address of the Chairman, he could not think of any subject on which he wanted any information. Looking at all the difficulties which had hitherto presented themselves, nothing but the most persevering energy and zeal could have enabled the directors to submit a balance-sheet which, although unaccompanied by the declaration of a dividend, appeared a satisfactory one. He was pleased with the property, and had the fullest confidence in the directors. The system of devoting their energies strictly to coal-getting was a good one. As coal was to be the chief source of profit their best energy should be devoted to its development. A fair return could be got from the rest of the property by sub-letting it, as the directors had done, and he so entirely approved of the policy of the board that he had no seconding the resolution.

The resolution was then put and carried unanimously.

The CHAIRMAN said the next business was the election of directors. Mr. Samuel Saunders and Capt. Kitto retired from the board, and he should be glad to see them re-elected, because he would be sorry to see any change in the present board.

Mr. JACOB moved that Mr. S. Saunders be and is hereby re-elected a director of the company. This resolution was seconded and carried unanimously.

A SHAREHOLDER said it would be a serious calamity to be deprived of the advice of Capt. Kitto, and they ought not merely to re-elect him, but to record their appreciation of the valuable services he had rendered. He moved that Capt. John Kitto be and is hereby re-elected a director of the company.—Mr. TAYLOR seconded the resolution, which was carried unanimously.

The CHAIRMAN said they must now appoint an auditor. The accounts had been audited by Mr. Sefton, who again offered himself for the appointment. He would not bias their minds in any way on this point, for it was a matter on which the shareholders ought to exercise their free will. The accounts had been of a decidedly complicated character, and the auditing of them occupied a considerable time.

Mr. Sefton had been at the office every day for some ten days or a fortnight until about 10 o'clock at night, and went all over the smallest details. He (the Chairman) had never seen such a searching examination of accounts. The fee was fixed by the board at only ten guineas per annum, and he would suggest that, more liberal remuneration should be accorded to the future auditor. The choice rested entirely with the shareholders, and he wished them to exercise it freely.

A SHAREHOLDER said they had better appoint Mr. Sefton again. The accounts were in a concise and intelligible form, and that was a great point gained. He suggested that the remuneration should be fixed at 50 guineas.

The CHAIRMAN could not recommend them to fix so high a fee. It was not unreasonable considering the work to be done, but they must remember they were not a wealthy company, and 20 guineas ought to suffice.

The SHAREHOLDERS then moved:—"That Mr. D. H. Sefton be and is hereby re-appointed auditor for the ensuing year, with a fee of 20 guineas for each audit."

Mr. JACOB seconded the motion, and it was carried unanimously.

The meeting was then declared extraordinary, and the notice convening this was read.

The CHAIRMAN said that copies of the resolution to be proposed had been sent to each individual shareholder. Some objections might be raised to the issue of preference shares: 1. The board would take its *pro rata* number, and as the preference was only 10 per cent. of the present holdings it was hoped that all the shareholders would do the same. The new proposal ought not to damage present holders, but in the event of their falling in their duty it was necessary to be in a position to offer some inducement to the public to subscribe. The Chairman then moved the resolution.

Mr. TAYLOR said he had every confidence in the present board, and as they must have money, and it would be carefully and well spent, he would second the resolution. It was then put and carried *nem dis*.

A cordial vote of thanks to the Chairman, directors, Capt. J. Kitto, and his brother, Mr. Frank Kitto, brought the meeting to a close.

### NORTON GREEN COAL COMPANY.

The first ordinary general meeting of shareholders was held at the Clarence Hotel, Manchester, on Jan. 22.

Mr. THOS. LEES in the chair.

Mr. ADAM S. LEECH (the secretary) read the notice convening the meeting.

The CHAIRMAN explained that this was the statutory meeting, and that, therefore, there was no special business. The Norton Green Coal Company had to commence operations on virgin soil, and within the last month they had begun work. The mines were, until lately, held in two or three lots, Norton Green proper having been some time in the possession of the vendor, by whom a further extent of about 40 acres had only recently been purchased. The best spot to commence work on was upon this 40 acres, but it was deemed advisable not to turn the soil until the conveyance was actually signed; and on the very day this document was signed, the first lot of what he hoped and believed would be the "Norton Green Coal Company's Mines" was turned. On the first formation of the company it was thought that the vendor would not require above one-half (6000*l.*) of his purchase-money paid, and if so, it would have been foolish on the part of the directors to dispose of more than 10,000 shares, because the less the number of shares sold the greater would be the profits of those interested. The brokers of the company, therefore, Messrs. Grosvenor, Entwistle, and Co., had instructions to sell only 10,000 shares, including 2000 which the vendor takes as part purchase-money; but these gentlemen, ever anxious to do business, and their professional experience, no doubt, telling them that advertising and various expenses were rather heavy, and consequently that more money would be required than was anticipated. Circumstances, over which the directors had no control, compelled them to pay over instead of 6000*l.* upwards of 10,000*l.*; this places the directors, therefore, in the position of having to dispose of a further 5000 or 6000 shares; but he hoped that they would not be compelled to again go to the general public for the money, as he was certain that any benefit ought to be given to the present shareholders.

Mr. HODGKINSON (the managing director), in submitting a report of the operations, regretted the delay that occurred, but as the directors decided not to open ground until all was finally settled, he was sure no one would blame them. They commenced operations first in the outcrop of the Froggery coal, and set a dip down in it of about 50 yards, 6 ft. wide and 5 ft. high. The coal is of a very good quality, and about 5 feet thick. They expected to find this coal cropped by old workings, and he yet thinks they will come upon some old workings done to a slight extent by former owners, but the coal is solid so far as they have yet gone. In connection with and near the mouth of the dip they have sunk and bridged a small air shaft about 8 yards deep, and have also commenced another air road or dip, which will accompany the main dip and be connected with it by thurlings, or headings, or cross-cuts, to ventilate the mine, and also to serve as the second road for the men to come out of the mine, as required by Act of Parliament. They have also commenced operations to open out by a dip, the crop of the Cockhead seam of coal. They have not yet opened out, but they would, if fully expected, be in it in three days. In the first dip they have laid down a tramway a little way, and are now busy preparing plans of the ground to continue this tramway on the surface to a spot where they will erect a jetty. From this it will be easy to continue the same to a branch of the canal, some 200 yards further on, where the coal can be run into boats right from the underground workings, and thus save time and expense in several emptyings and fillings. They have also selected a suitable spot for the erection of a winding engine, so that both dips or inclines can be worked at one and the same time, and also be convenient to pump should they hereafter find it requisite to do so. They may possibly meet with a little water in the old workings, but he feels pretty certain that nearly all, if not all, their coals are dry. In conclusion, he firmly believes that all that is stated in the prospectus will be performed, and he could assure the shareholders that the company have secured an immense lot of most excellent coal, and which lie a more advantageous position for working and winning than any of the adjoining collieries, also that the quality of the coal is such that it commands a ready sale in the neighbourhood.

The CHAIRMAN, in reply to enquiries, stated that about 11,000 shares had been sold and paid up, and they required to place 6000 or 6000 more.

Mr. HODGKINSON stated that they expected to meet with old workings at 30 yards, but had not met with any at 50 yards. They will want time, and an engine to pull the coals, and then 1000 or even 2000 tons per week is an easy matter. They can work the Froggery and Cockhead seams together with a 40 or 50-horse engine, and it will likewise enable them to reach the Bullhurst seam, 7 ft. thick. He estimated that the two former seams would yield 300,000 tons. At present they were only getting surface coal and small, but it improves in depth.

Votes of thanks to the manager and chairman terminated the proceedings.

### ALLTAMI COLLIERY COMPANY.

A meeting of shareholders was held on Wednesday, at the offices of the company, Great St. Helen's.

Mr. RICHARD DUKE in the chair.

Mr. E. J. BARTLETT (the secretary) read the notice convening the meeting.

The CHAIRMAN said: I have pleasure in proposing that the balance-sheet, taken as read, be received, adopted, approved, and passed. The very lucid and simple accounts that have been prepared must give satisfaction; full explanation as to the disposal of the money advanced, and the balances of capital, &c., will be seen. It is evident that our property so recently operated upon has been most efficiently conducted, and there are few undertakings of this class that can be compared to it for work accomplished in so short a space of time and with so glowing a future.—The proposition was seconded and carried.

Mr. E. J. BARTLETT: A. The Chairman has stated, the balance-sheet was drawn up to show carefully the expenditure under the several heads. There are one or two items to which I should like to call your attention—first, the cost of buildings, which we have found it necessary to erect at section B. These are now complete, and are amply sufficient for all our purposes. With regard to section A, at the commencement of operations it was stated that the appliances for work would necessarily be simple, the coal being reached at a shallow point, which, of course, lessens the cost for extraction, and altogether operations here have been most satisfactory. A considerable distance has now been opened on the main seam, and the average thickness proved to be about 10 ft. While operations are proceeding for opening up the coal for economical extraction the greater part of the raisings must be regarded as slack; but now the mineral is ready for stripping down a good output must result. To facilitate the working the directors have placed a portable engine over the pit, and there can be no doubt that operations at this part of the mine have exceeded all expectations. At section B certain charges upon capital account have been found necessary, which are now at an end; coal has been reached in the new drift, whilst on the other side the pit the old workings have been cleared out, and the mineral left by former workers discovered; and there can hardly be a doubt but that the output from this portion of the property will be most considerable, the machinery for hauling being equal to a large get, and there is every reason to expect that section B will quite equal expectations, and that the returns of coal will show well in the next year against the expenditure found necessary to be incurred. At section C the directors propose securing an engine capable of taking them down both the Hollin and main seams; and this being charge upon capital account, the directors have issued the 1000 shares. The expenditure has, no doubt, appeared large, but the object has been to accomplish an amount of exploration, and the result must be considered as highly satisfactory. With regard to royalty, it is most moderate, the rent of 40*l.* per annum merging into it, and there is everything to stamp the colliery as a valuable investment. The directors have taken power to secure adjacent lands, in order to make the undertaking of a more lasting character, and they will be careful to admit of such leases only as would bear the most searching examination.

Dr. BURT: I can only say I am very pleased at the rapid development our property has received, and feel satisfied that the future will realise handsome dividends.

The CHAIRMAN then reminded the shareholders that the 12 months' working did not expire until April next. He then moved:—"That the directors' report be adopted, and that a distribution of 5*s.* per share be made upon the 2000 shares at present issued."

A SHAREHOLDER seconded the motion, which was carried unanimously.

The next resolution was:—"That the application list for the issue of the 1000 shares remain open until Feb. 4, to enable the shareholders to participate in such issue."

Mr. GEORGE SMITH seconded the proposition, which was carried.

The meeting then became extraordinary.

The CHAIRMAN pointed out the desirability of increasing the company's sett, and concluded by moving the resolutions relating thereto, which were adopted.

The SECRETARY said the power taken in the resolutions enabled the directors to secure adjacent lands, about 220 acres have been approved by two eminent engineers, who estimate the quantity of coal to be acquired at over 7,000,000 tons. It has been thoroughly tested by bore-holes in all parts of the property, and its acquisition will undoubtedly place a much greater value on the shares of the present company.

A SHAREHOLDER said from intimate knowledge of the neighbourhood he was







It was very satisfactory to receive the confidence and satisfaction of a gentleman occupying the social position of Mr. Dunlop; and he (the Chairman) could only assure the meeting that as hitherto everything would be done so to conduct the development of this great mine as to ensure a career of progressive prosperity. The meeting then separated.

#### THE CATHEDRAL TIN AND COPPER MINING COMPANY.

The general meeting of shareholders was held at the mine on Jan. 15. Mr. MATTHEW GREENE in the chair.

The notice convening the meeting having been read, the CHAIRMAN read the report of the manager on the operations that had been carried out since the last meeting, and the highly satisfactory state of the mine, as follows:—

The following is my report of the operations at this mine since the last general meeting:—The main engine-shaft has been sunk 45 fathoms from surface. As a depth of 30 fathoms a very important discovery of copper ore was made, which has been sunk through for 15 fathoms, and opened on east and west in the 20 for 30 fathoms in length. The lode throughout the sinking and the driving has been worth for copper from 12s. to 30s. per fathom. I consider we have already discovered ore ground which will produce 6000 tons, sterling at the very lowest estimate. The fact of this deposit of ore being situated between two cross-courses about 75 fathoms apart (the shaft being about midway), and that in the adit level a magnificent gossan extends the whole distance, is of the utmost importance, as in this district (Gwenapan) a continuous gossan back is a positive indication of a rich lode below. At our next setting we shall start to drive east and west on the course of the lode, in the 30 fm. level, under adit. Two winzes are being sunk in the bottom of the 20. No. 1 winze, 10 fathoms west of shaft, is down 7 fathoms, worth 20s. per fathom. No. 2 winze is only just commenced in a good lode of gossan, green carbonate, and grey copper ore, worth 15s. per fathom. The slope in the back of the 20 west is worth 15s. per fathom. The lode in the bottom of the engine-shaft is 3 ft. wide, worth 20s. per fathom. All necessary surface works, including dressing-floors, drying-house, sampling-house, sheds, &c., are complete, and I look forward confidently to being in a position before the year is out to make profits of at least 5000s. per annum. I only want time to cut out the sections of ore ground discovered, so as to take it away and return the ore to market in the cheapest manner possible.—JOSEPH MITCHELL.

The accounts of the company, audited by Messrs. Johnstone, Cooper, Wintle, and Co., were then read.

The CHAIRMAN, in moving the adoption of the report and accounts, said that it was with much pleasure he had called the shareholders to this meeting on the mine to-day, as it would enable those attending to examine the property, and to form their own opinion of the excellent prospects of the mine. It is well to remember that the situation of this mine is exceptionally good; it is in the heart of the very richest copper-producing district in the county of Cornwall, a district of unparalleled mineral wealth, and to which many Cornish families are indebted for their great fortunes and high position. It is a fact that in the neighbouring mines, on the very same lode as the one we are opening on in Cathedral, a profit of 400,000s. was made, the lode, at a corresponding depth, not having been either so large or so rich as at Cathedral. The manager, whose report I have just read, has been employed in the Gwenapan mines for over thirty years, and he speaks from a long experience when he says he can henceforth return us cent. per cent. for our outlay. I find, on reference to his report, that his statement has every likelihood of being fulfilled, judging from the present productive character of the lode and its position between two cross-courses, which is a feature of the utmost importance, and I am sure that the shareholders will be amply rewarded for their enterprise and the manager for his care and exertions. I beg to move, gentlemen, that the report and accounts be received and adopted.

The resolution having been put to the meeting, was seconded and carried.

Messrs. Matthew Greene, J. B. Freeman, and Adam Murray were elected as directors for the ensuing year.

Messrs. Johnstone, Cooper, Wintle, and Co. were re-elected the auditors.

The MANAGER stated that for the next six months, while fairly developing the mine (judging from the present appearances), he should be able to sell 3000s. worth of copper ore against a cost of 1500s.

The CHAIRMAN: Which simply means, gentlemen, a dividend of 20 per cent. on the total capital of the company, which is only 15,000s.

Capt. TEAGUE, of Tincroft, in answer to a shareholder, stated that he had a very high opinion of the property, and so satisfied was he that a good mine was being opened that he considered it would be an excellent course to commence operations outside the cross-course, as doubtless similar good discoveries of copper ore would be met with. The fact that upwards of 700s. worth of copper ore had already been sold at so early a moment augured well for future results.

A cordial vote of thanks to the Chairman, directors, and managers terminated the proceedings.

The annexed letter was received from Capt. Teague on the occasion of his inspecting the mine for a gentleman a few months since, when the ore was first met with, since which time the mine has been steadily improving:—

"In accordance with your wishes, I yesterday went underground at Cathedral Mine, and must say I was much surprised and gratified by the appearance of the lode in the ends, which are being driven east and west of the shaft in the 20. The lode is opened on at this point about 5 fms. in length, and is worth for copper ore about 25s. per fathom for this length, the present ends being of the same value. A more promising lode I have not seen at such depth for many years, and the change from the gossan to red oxide, and from the latter to yellow copper ore, is what the best mines in this district are characteristic of, and have rarely been known to fall in producing large quantities of mineral.—WILLIAM TEAGUE."

#### GLASGOW CARADON CONSOLS COPPER MINING COMPANY.

The general meeting of shareholders will be held at Glasgow, on Monday, when the directors will submit the annual report and accounts. The profit on the twelve months' working was 4365s. 19s. 4d., which added to 779s. 19s. 9d. brought forward from the previous year gave an available balance of 5145s. 19s. 1d. The interim dividend paid to the shareholders in September last absorbed 1791s. 7s. 9d., leaving 3354s. 11s. 4d. now at disposal.

The directors report that every effort has been made to push on the work at mine with the utmost vigour. The lode in the 78 did not continue so good as was expected. A cross-cut, however, has been driven south, with the view of cutting what was believed to be the main ore-bearing part of the lode. This has been cut, and from what has been seen in the levels above, it is expected it will prove valuable. This falling off affected to some degree the sales of ore during the year, which are 57 tons less than during 1873. The price realised is 288s. 6s. 3d. over 1873, and had it not been for the low standard early in the year the returns would have been very much larger. The falling off referred to also increased the dead work, as more ground had to be driven in proportion to the ore raised, and so brought the costs higher they would otherwise have been. Operations will have to be commenced for sinking the new shaft from surface, and completing and easing it down to the 78. Before going on with these, as the present lease has only six years to run, the directors considered it desirable to communicate with the lords regarding its renewal. Messrs. Elliott, who have always met the company in a liberal manner, have expressed their willingness to renew the lease; but they intimate their desire that if the lease be renewed the eastern portion should be worked. This part of the sett cannot be raised. The capital of this company was 100,000s. The directors have admitted the outlay which would be required. Messrs. Elliott have offered if a new company were formed to concur in an arrangement by which this portion of the sett might be taken over, and a lease granted for the respective portions. Were this piece of ground worked, and the lodes in it found good, which there is every reason to expect, the value of the company's property would be materially increased. It would, therefore, be a desirable thing if such an arrangement could be carried out, and a resolution in accordance with it be submitted to the meeting. An interim dividend of 10 per cent. has been paid, and the directors recommend that a further dividend be now declared of 12½ per cent., making 12½ per cent. of income tax for the year. This will leave 697s. 11s. 3d. to be carried forward to next year's accounts.

#### PORT PHILLIP AND COLONIAL GOLD MINING COMPANY.

The general meeting of shareholders will be held at the Terminus Hotel, on Thursday, when the following twenty-first annual report will be read to the meeting:—

The yield of gold (exclusive of pyrites) for that year shows, as compared with the year 1873, a slight increase per ton. The average return of quartz crushed for the past year was 4 dwts. 1½ grains, compared with 3 dwts. 23½ grains for the year 1873. The gold obtained from the mills during the past year added 8 grains to the yield per ton, compared with 9 grains in the preceding year. The quantity of quartz crushed by the company on joint account during the year ending on Oct. 7, 1874, amounted to 61,021 tons, being a decrease of 2665 tons as compared with 1873, and of 5278 tons as compared with the year 1872. The produce of gold (including that from pyrites) during the past year was 12,402 ozs. 5 dwts., being a decrease as compared with the year 1873 of 264 ozs. 13 dwts. There was also crushed for tributors and others 5201 tons of quartz, which realised on joint account of the companies the sum of 1329s. 8s. This item of receipts which did not appear in last year's accounts. The receipts and expenditure at the mine on the joint companies' account for the past year show a credit balance of 538s. 16s., and small as this sum is, it compares favourably with the return of the year 1873, which showed a loss of 1366s. 7s. 9d. The average yield per ton of the quartz crushed from the commencement of the company's operations (820,859 tons) has been 8 dwts. 6 grains. The total expenditure per ton of quartz raised and crushed was 18s. 6d. per ton, being a saving on last year of 3d. per ton. The mine costs were 10s. 11s. 3d., and at the reduction works 4s. 7d.; but taking into calculation the extra stock of firewood on hand, and the amount expended in sinking the north shaft 113 ft., and for labour in driving the cross-cut at the No. 9 level, the cost per ton of quartz raised and crushed did not exceed 14s. 3½d. The expenditure at the mine for the past year was less than that of 1873 by 696s. 4s. 4d.; and at the reduction works by 998s. 6s. 3d. together, 1694s. 10s. 7d.

Referring to the subject of firewood, Mr. Bland informs the board that the company commence the current year 1874-5 with a stock of 1004 cords, of the value of 1670s., as against 145 cords, value 226s., at the commencement of the year 1873-4. Mr. Bland also states that he had accepted tenders for 700 cords at 32s., as against last year's average of 34s. 9d. per cord. The requirements of the company under this head will be much less for this than for last year, and it is probable that the price of firewood will be still further reduced before the close of the season. In the month of July last Mr. Bland applied for, and obtained, the services of Mr. John Lewis (the superintendent of the New North Clunes Mine), who after examining this company's mine, made two reports. Respecting the machinery, Mr. Bland writes that it was all in good order, and had worked well during the year. There had been only one accident—the breaking of the main shaft of the mine pumping gear, caused by defective iron, but it was repaired, and the pumps have been working well since. The reserve fund, amounting to 5388s. 16s., is invested in Victorian Government Five Per Cent. Debentures. The directors have determined to forego altogether their fees for the year 1873, there are no liabilities in England, excepting the amount charged for directors' fees for the past year, which are still due, and those in the colony are Mr. Bland's salary, &c., and the current working expenses. The revenue account shows a balance to its credit on Dec. 31, 1874, of

the sum of 973s. 14s. 9d. The board very much regret that they cannot at present recommend the payment of a dividend. The directors who retire by rotation are Messrs. Alfred Cobbett, Alfred Taddy Thomson, and John Randal MacDonnell, being eligible offer themselves for re-election.

#### VICTORIA (LONDON) MINING COMPANY.

The general meeting of shareholders will be held at the Terminus Hotel, on Thursday, when the following fourteenth annual report will be presented:—

The investments of this company are represented by the sum of 6987s. 12s. 5d. LONDON AND MELBOURNE COMPANY.—As stated in last year's report, a portion of this company's property has been leased to the United Kingdom Extended Company, and Mr. Bland writes by the last mail thus:—"I am very glad to say that the position of the United Kingdom Extended Company has greatly improved since the date of my last letter. They seem to have lifted over their financial difficulties, and renewed work with very good prospects, having apparently struck the lode that the United Kingdom Company has been successfully working for some time past." The board are also in possession of extracts from a colonial newspaper, which, under date Oct. 14 last, says under this head "We have cut several leaders yesterday and to-day, all of which are carrying gold of a highly remunerative character, which will shortly be proved by crushings. There is no doubt locally of the success of the mine, which will be second to none in a very short time." On Oct. 17 the same paper states, "The mining manager reports that he has cut the western reef, the same as that now being worked by the United Kingdom Company from the cross-cut at the 120 feet level. The thickness of reef 12 feet, showing gold freely; will start crushing on Monday, and he feels confident that the results will be highly satisfactory to the shareholders." Again on Oct. 24 appears this extract:—"During the past week we have been crushing with six heads, and the plates look very well. We have driven 18 feet along the reef south; it is fully 7 feet thick, and shows gold all the way. We expect in another week to be able to drive the 12 heads with our present steam-power."

SOUTH CLUNES COMPANY.—Mr. Bland writes, under date of Nov. 2, that "at the south end of the mine the quartz lodes continue to look well, and are being opened up as rapidly as circumstances will admit." Mr. Bland sends a return of the operations of the mine from July 1 to Nov. 2 last, of which the following is a copy:—Quartz and alluvial crushed, 19,599 tons; gold obtained, 2861 ozs. 11 dwts.; proceeds of gold, 11,673s. 5s. 11d.; mine expenditure, 6696s. 11s. 4d.; leaving a profit of 4976s. 14s. 7d. Four dividends have been declared of 5s. per share, and this company have received during the latter part of last year the sum of 800s., their share of such dividends.

THE PARROT OF WALES COMPANY.—Gold is being raised in small quantities on this company's property.

The shareholders will doubtless recollect that the opinion of a meeting held some years since was that no further investments should be made by the directors, but looking at the results now being obtained from the South Clunes Company the board propose that the amount on deposit at the company's bankers on capital account be now available for investment. The investments on the company's books are as under:—London and Melbourne Company, 300s.; South Clunes Company, 4987s. 12s. 5d.; Prince of Wales Company, 1692s.—6987s. 12s. 5d. Add capital in hand—On deposit, 1500s.; current account, 9s. 17s. 9d.—1509s. 17s. 9d.; making a capital of 8497s. 10s. 2d. The dividends during the year were 800s.; interest and registration fees, 50s. 3s. 5d. The company's expenses in the colony were 14s. 10s. 6d.; and in London, 68s. 18s. 7d.—83s. 9s. 1d. The financial position of the company in the colony on Oct. 31 last was 11s. 0s. 11d.; and in London on Jan. 1 last, as under: At the Imperial Bank, London, on revenue account—On deposit, 500s.; on current account, 737s. 3s. 5d.; bill receivable, 185s. 9s. 6d.; petty cash, 1s. 6s. 9d.—1423s. 19s. 8d. The directors recommend an additional eight pence per share, on the fully paid-up shares of 6d. per share on the partly paid-up shares, both free of income tax, payable on Monday, March 1. The directors who retire by rotation are Messrs. Henry Moor and John Randal MacDonnell, who being eligible offer themselves for re-election.

PROVIDENCE MINES.—At the meeting, on Tuesday, the accounts for the 16 weeks ending Dec. 18 showed a profit of 145s. 19s. 6d., and a credit balance of 572s. 1s. The dues have been given up by the lords during pleasure to assist in the development of the mines. During the 16 weeks 55½ tons of tin were sold, realising 3082s. 8s. 7d. The price paid for 419½ tons of coal, including freight, was 16s. 10d. per ton, exclusive of 3d. per ton landing dues. Capt. Wm. Taylor and Wm. J. Taylor, after reporting upon the various points of operation referred to in the directors' report, state that they have ten pitches working in different parts of the mine, at tributes varying from 9s. 6d. to 12s. 6d. in 17. They have further improved the dressing-floors, which are now equal to all their requirements. The directors recommend an additional eight pence per share, on the fully paid-up shares, and of 6d. per share on the partly paid-up shares, both free of income tax, payable on Monday, March 1. The directors who retire by rotation are Messrs. Henry Moor and John Randal MacDonnell, who being eligible offer themselves for re-election.

NEW PEMBROKE.—At the meeting, on Jan. 19 (Dr. Treffry in the chair), the accounts to Dec. 5 showed a debit balance of 363s. 15s. 8d. Captains Francis, Puckey, and Charles Merrett reported upon the various points of operation. The average prices for stopping the lode throughout the mine is about 3s. per fathom. The tribute pitches in the mine are working at the average tribute of 12s. in 12. In the 75 fm. level cross-cut driving north, in Mr. Rashleigh's land, to intersect a large lode which has yet only been seen at surface, the ground is favourable for progress, and is being driven by four men, at 6s. 10s. per fathom. They appear to be approaching a lode or branch, as the water is issuing very strongly from the end. At the 90 they have a cross-cut driving north, also in Mr. Rashleigh's land, to intersect a lode worked on at the 75 fm. level. This cross-cut is driving by four men, at 7s. 10s. per fathom. The 110 cross-cut, north of shaft, to intersect the middle lode, is driving by four men, at 7s. 10s. per fathom, and they expect to cut the 75 fm. level cross-cut in the next general meeting. In consequence of Mr. Rashleigh's liberality in giving up his dues, they have increased their expenditure to further develop the north lode at deeper levels, and which they consider will ultimately prove a very great benefit, both to the lord and adventurers.

'For remainder of Meetings see to-day's Journal.'

#### FOREIGN MINING AND METALLURGY.

The questions which Belgian industrialists have now to solve relate especially to wages, to raw materials, and to transport industry, but of still greater importance is everything relating to the extension of exportation outlets. It is this latter point which deserves, perhaps, the most attention, and which calls for the exercise of a little more boldness on the part of Belgian industrialists. Belgium appears to require more sustained, more serious, and more intelligent commercial relations with all parts of the globe; if consumers will not come to Belgian industrialists Belgian industrialists must go to consumers. It is easier, of course, however, to indulge in theories upon this subject than to arrive at any practical result. At the last meeting of the industrial bourse at Brussels there was comparatively little business passing, and the prices offered for iron were almost nominal. Now would be the moment to make purchases, low rates having been carried at Liège and Charleroi to their utmost possible limits. The promised order for rolling stock for the Belgian State lines, which is anxiously anticipated, has not yet been given out.

The business passing in copper at Paris has been comparatively limited, and has been restricted rigidly to the requirements of consumption. The German copper markets have generally remained feeble, at the same time they have shown no great reduction in prices. In consequence of the fall which has appeared in tin at London, prices have been drooping upon the Dutch markets. Thus, Banca has fallen from 58½ fl. to 57½ fl. Some transactions have been noted in Billiton at 53½ fl. There has been comparatively little business in tin at Paris, and prices have been tending downwards. The German tin markets have exhibited little change. Quotations for lead have been to some extent nominal at Paris. The German lead markets have not varied. Zinc has maintained a firm tone at Paris. At Marseilles, Vieille Montagne zinc in sheets has brought 32s. per ton. Zinc has been generally firm upon the German markets.

Strikes among French coal miners are stated to have become practically extinct in France. The miners have accepted almost everywhere the reductions in wages proposed by their employers, as they have been convinced that even in their own interest it was indispensable to submit to a reduction imposed by circumstances. The French coal markets continue to exhibit little animation for the present; some contracts have been renewed at previous rates. The French Government has granted concessions of some new lines, which seem likely to embrace various important collieries. When the St. Louis Canal is terminated French coal will also gain ready access at low transport rates to Marseilles, and will commence a serious competition against foreign coal, as from Feb. 1, 1875, coal imported into Turkey will be subject to a duty. Official tables show that the coal production of France—that is, France as at present reduced—in 1859 amounted to 7,626,655 tons; in 1873 it had been carried to 17,485,752 tons. In the first half of 1874 the coal production of France was 8,290,552 tons.

The question of a general reduction in wages is seriously occupying the attention of Belgian colliery proprietors at the present juncture. It is difficult to see how such a course could be avoided, since such a movement has been inaugurated in England and France. A slight reduction in the selling price of coal must, of course, accompany any reduction in coalminers' wages in Belgium; such a reduction would, of course, have a tendency to revive and increase consumption. The Belgian sugar manufacturing interest has completed its purchases for the present season, brickmakers and limeburners are making comparatively few purchases, metallurgical industry finds itself reduced to great depression, and the weather has again become mild. All these circumstances tend against high prices. The

Belgian coal markets remain without variation for the present, but with great uncertainties as regards the future.

The French iron trade has remained quiet, pig having been especially dull. Some transactions are noted at St. Dizier, but at slightly lower rates. Special qualities of iron have been in some demand, but this circumstance cannot have a serious influence upon the iron trade generally. Plates have been held with some firmness at 12s. per ton; this has been attributed to the small number of works producing them. Attention is being directed in France to the question of rolling iron upon the Louth and Deby system, which has been advantageously carried out in Belgium; this system admits of a double production, without, it is stated, a full corresponding increase in current outgoings. Upon the whole, the general tendency of the French iron trade has been rather bad than good; a proof of this is afforded in the fact that wherever strikes have occurred they have generally soon terminated, the workmen submitting to reductions of wages against which they had at first protested. Official decrees, which had been long rather anxiously anticipated, have at last appeared, and will allow the construction to be proceeded with of several hundreds of miles of railway in the North of France. It is expected that each mile of new line thus conceded will absorb in its road-bed 160 tons of iron, but the permanent way may, of course, not be ready for the rails before 1876. The intelligence received with respect to steel is generally favourable. The Denain Works are about to commence operations; almost all the other steel-producing establishments of France are working with energy, processes are being simplified, and the yield is increasing. The Seraing Works, it may be noted, have just succeeded in producing steel by running it direct from the blast-furnaces; this is an important step in advance. It appears from official returns that in 1859—deducting the departments since ceded to Prussia—France produced pig-iron to the extent of 758,682 tons; in 1869, after making a similar deduction, the corresponding production was 1,018,899 tons. In the first half of 1874 it was 693,745 tons. The production of iron in 1859 in France, as at present reduced, was 466,823 tons; in 1873 it amounted to 760,269 tons, and in the first half of 1874 to 387,102 tons. The production of plates, which stood in 1859 at 64,947 tons, had increased in 1873 to 129,623 tons; in the first half of 1874 it figured for 66,111 tons. As regards steel, the increase in its production in France has been rapid. In 1859 the production amounted to only 16,923 tons; in 1873 it had been carried to 155,568 tons, and in the first half of 1874 it was 105,234 tons. Apropos of steel, it may be noted that a discovery has been made at Constantine, Algeria, of new bearings of minerals adapted for its production; this discovery has been very welcome, as previously existing supplies were scarcely likely to meet the demand.

#### THE WEALTH OF SILVER MINES.

The wealth of silver mines is historic. We are informed by Humboldt that the yield of the Mexican mines since the Conquest to 1803 had been \$2,027,952,000, all of which was produced from a few central spots, and the mining confined to a comparatively limited circle.

MEXICAN MINES AND MINING.—The registered coinage of the mint of Mexico from the year 1733 to 1860 shows \$1,742,573,107. When we remember that the royalty to the King of Spain, to whom until the commencement of the nineteenth century the Mexican States paid tribute, was one-fifth, or 20 per cent. of the yield, and take into consideration the royal monopoly of quicksilver and gunpowder, the result seems astounding. The Mexican method of mining was crude and simple. The ore as well as the water from the bottom of the shafts was generally brought to the surface upon the shoulders of *teneros* (carriers) over ladders. Their *arastres*, or crushing mills and amalgamators, were of the rudest possible character, and were run almost wholly by mule power.

IMMENSE RETURNS.—The following is the registered yield of a few mines on the American continent:—

Bisacina Silver Mine .....	\$ 16,341,000
Santa Anita Silver Mine .....	21,347,210
Valencia Silver Mine .....	31,513,486
Rayas Silver Mine .....	85,421,014
Vetra Madre Silver Mine .....	235,935,736
Vetra Madre of Guanoato .....	600,000,000
Vetra Grande de Zacatecas .....	650,000,000

The Pavellon Silver Mine, when first opened, produced \$20,000 per day for five years, when a torrent of water from the mountains filled the shafts and swept away the improvements. It was opened again, and for the succeeding 10 years yielded \$60,000,000, when it was again abandoned in 1896, and not opened again until 1781, when it was vigorously worked for eight months, the ore taken from it in that period yielding \$11,500,000. The different members of the celebrated Fagoaga family of Mexico are estimated to have received during 50 years working of two veins over \$16,000,000 as profits. The Carmen vein, north of Durango, in the State of Chihuahua, among the mines of Batopilas, has produced enormous yields of silver. From this mine three masses of pure malleable silver were taken, weighing collectively 870 lbs.

SILVER MINES OF HIGH ALTITUDE.—The best silver mines are those of high elevation. It has been the experience in Mexico, and it is a well-known fact, the mines of Great Potosi, which have produced over one thousand millions, are worked at a height exceeding that of Mount Blanc. Those of Colorado—the Terrible, Pelican, the far-famed Caribou, the Moose, and others—are at an elevation of from 8000 to 12,000 feet above the level of the sea, yet in the vicinity of most fertile parks and unfailing streams. The French Mining Commissioner Simonin states—"The silver mines of Colorado give indubitable evidences of great wealth; the ores are true silver ores, and the mines almost identical with those of Mexico, of which they are a continuation." Fuller, in his treatise on silver mines, says—"Wherever, in any part of the world, silver mines have been worked, they are worked now, unless from some unexplainable cause. The lack of machinery, the existence of war, and the invasions of Indians have, as in Mexico, familiarised our minds with the idea of abandoned mines. But they have all been abandoned for some other cause than that they are exhausted. We know of no silver mining regions in the world that have given out."

INEXHAUSTIBLE RICHES.—The mines of Mexico, originally worked by the native Aztecs, before the Spanish conquest, are worked still. The mines of the Andes have given forth their wealth for more than three centuries. The mines of old Spain have been worked from the middle ages, and are in working condition now. In Hungary the same mines worked by the Romans before the birth of Christ still yield their steady increase. The silver mines of Freiberg, in Saxony, worked from the eleventh century, have no diminution. In Bohemia, Tyrol, Norway and Sweden, on the Ural and Atlas Mountains, and, indeed, wherever the discoveries of silver mines have been made, we believe without exception, the mines continue to be worked to the present day, and are generally more productive now than at any time during their past history. Silver mining, for permanent and rich returns, has had its parallels in no other business.

SUPERHEATING APPARATUS.—Mr. W. E. GEDGE (for Mr. Lepet, of Paris), has patented a new and improved system of furnace and superheating apparatus for smelting metals in crucibles, and for various uses. This invention relates to improvements in the furnaces used in the manufacture of cast-steel and analogous manufacture, and particularly in the relation to the superheating of air. It consists in the construction and use of a metal superheating apparatus, kept at a proper temperature by a continuous current of air; in the application of the same principle for the preservation of metallurgical furnaces, by means of a double casing with circulation of air, which it also superheats, and in the construction of a movable metal bottom or sole-plate to the furnace, by the use of which the crucible or pots are withdrawn from the furnace promptly, easily, and without any danger.

ARTIFICIAL FUEL.—Mr. R. K. ATCHISON, of Redcar, proposes to make use of peat as the basis of his fuel, and to combine therewith charcoal and the chlorides of calcium and sodium, which will combine with the phosphorus, sulphur, and other impurities contained in the ore, or which may be found mixed with the iron.

DEPOSITION OF METALS.—Messrs. UNWIN, BROOK, and DRAPER, of the Globe Works, Sheffield, have patented the use of certain metallic substances, to be used either separately or combined, which when deposited upon iron, steel, or cast metal will to a considerable extent preserve them from the rust and decay produced by the action of the atmosphere or of water, either salt or fresh. We deposit upon iron, steel, or cast metal, lead, tin, zinc, and antimony in a molten state, either separately or combined. Then upon these substances we deposit with a sulphate or cyanide solution, copper, brass, or nickel by the aid of electricity. Either sulphate or cyanide solutions may be used, but we prefer the double sulphate.



## TREATMENT OF TIN SCRAPS.

In the manufacture of tin ware it is said about 6 per cent. of the whole of the plates employed disappears in the form of scraps. The enormous trade in sardine boxes produced at Nantes, in 1869, nearly 400 tons of scrap; Birmingham produces some 20 tons per week; and Paris 50 to 60 tons per month. A small quantity of these scraps has always been used in various ways, such as the addition of a small quantity to the pig-iron intended for steam cylinders; another small portion was treated by concentrated sulphuric acid, or a solution of caustic potash; but no one treated tin scrap on a large scale until a short time since.

The utilisation of a waste substance is like the saving of a penny, it helps to keep the pound unbroken, and the best method of utilising such a large product as tin scrap becomes a matter of importance. The subject has been treated in the journals within a short time. M. Kuenzel has taken up the subject in an exhaustive manner in the *Berg und Huttenmannische Zeitung*, which demands attention. The article is of considerable length, but we shall give the purport of it in the shortest space consistent with intelligibility. The mode employed comprises four chief operations: (1) treatment of the scraps by means of boiling in water acidulated with hydrochloric and nitric acid, until the tin is dissolved; (2) precipitation by means of zinc of the tin contained in the above solution and washing of the precipitate; (3) solution of the precipitated tin in hydrochloric acid, and crystallisation of the chloride of tin; (4) utilisation of the iron scraps when despoiled of the tin.

1.—Care in buying tin-plate scrap is one of the first essentials in a financial point of view. Good tin scraps contain from 5 to 9 per cent. of tin. Of course, the thinner the plate the greater is the amount of tin. French tin-plate has  $1\frac{1}{2}$  to 2 per cent. more tin than English, as the plates are rougher, but it is very important to remember that French tin is often, probably almost always, mixed with lead, a fact which may be ascertained by wiping the tinned article with a clean handkerchief, when if lead be present it will show itself. If the lead exceeds 10 per cent. of the tin the scraps should be refused, as they are more difficult to treat, and leave the iron in a worse condition. Lacquered tin boxes, like those used for French sardines, give bad scrap, for the lacquer has to be destroyed by heat, which reduces the amount of tin recovered. Sometimes the scrap does not contain more than 2 to 4 per cent. of tin instead of 6 per cent., besides being mixed with lead. Galvanised iron (*fer zingue*) should also be rejected. When not packed, scrap tin is very difficult to carry; a 10-ton truck will not hold more than 3 to 4 tons; the best way, if possible, is to pack the scrap in old barrels or cases, and ram it down well. In France the scrap is made up into packets by being rammed into a wooden mould, rather broader at top than at bottom, and holding 1 or 2 cwt.; the packet is then fastened round with iron wire. The scrap thus packed must be well separated, or many pieces will stick together, and the action of the acid will be materially impeded.

2.—The solution used to dissolve the tin is composed of one part of raw nitric acid and ten parts of raw hydrochloric acid. At first wooden vats holding about 3 cubic metres were used, but the acid destroyed them rapidly. The best vessels are those of stoneware, or vats of wood or of brick dressed inside with a hot mixture of one part of sulphur and two parts of sand. At the bottom of the vat, which should contain at least one metre cube, a vulcanite pipe is introduced, through which steam may be introduced from a boiler. The vat, or back, is nearly filled with scraps, a 3-metre vat will hold about 600 or 700 kilos., the mixture of acids is then poured over the scrap, and water added to about four-fifths of the height of the scraps; the steam is then introduced till the solution completely covers the scraps, and is continued until the whole of the tin disappears from the upper scraps, and hydrogen ceases to be disengaged, showing that the solution has become neuter. The boiling takes generally about half or three-quarters of an hour. A cock at the bottom of the vat allows the liquid, which contains all the tin, a certain quantity of chloride of iron and of chloride of lead when the tin is not pure, to run off into a receiver into which nearly all the chloride of lead is precipitated by cooling. For the treatment of 1000 kilos. of scraps, containing 5 to 6 per cent. of tin, the average quantity of acid employed is 300 kilos. of hydrochloric, and 30 of nitric, diluted with  $3\frac{1}{2}$  to 4 cubic metres of water, of which a small quantity is used to wash the iron left in the vat, but which is saved for the next operation. The iron is then removed by means of forks, and made up into packets of various sizes, according to the purpose intended. These must not be kept in heaps, for they oxidise rapidly, and the heat thus produced will even heat them to redness. A heap of about 100 tons was once burned in this way. For the treatment of 3 tons of scrap in 12 hours, six or seven vats, of about 3 cubic metres capacity each, are employed.

3.—The solution cooled in the receptacle already mentioned is now transferred to a large wooden or brick cistern, filled with old zinc plate or scraps, which precipitates the tin, and also any lead which remains in the solution. This process should not produce any gas, as that would show the solution to have been too acid, and cause a useless loss of zinc. From time to time a small quantity of the solution, slightly acidulated by means of sulphuretted hydrogen, is tested to ascertain if the precipitation is complete. The operation is generally effected in two hours. When terminated, the solution is run off from the bottom through a filter made of sail-cloth, which stops any of the tin precipitate which may be floating, and the liquid is of no further use. The zinc is then moved about to cause as much of the tin as possible to fall to the bottom, and the solution from another boiling is then introduced. This operation is repeated until this vat or cistern is one-third or half filled with tin. About 65 to 75 parts of old zinc are required to precipitate 100 parts of tin. Theoretically it should only require 55 parts, and the overplus must be attributed to an excess of acidity and to the oxides of zinc and lead generally present in the old zinc.

The precipitate obtained, which is mixed with fragments of zinc and tin solder from the old zinc, is taken out of the vat and thrown on a metal sieve with holes about three or four 2-5ths of an inch in diameter, and a stream of water being directed on the sieve, the precipitate is carried on to a sail-cloth filter. On the metal sieve will be found scraps of tin-plate not affected by the acids and some tin solder; the former is thrown into the boiling vat, the latter cast into ingots for sale. The precipitate is washed in the filter so long as any trace of iron remains, and is then placed in canvas sacks, and the water squeezed out by means of a screw or hydraulic press. The precipitate is employed in making chloride of tin; it is well to dissolve it in hydrochloric acid as soon as it is taken out of the press, or at any rate to sprinkle it with it, as otherwise the tin oxidises rapidly, and the oxide will not afterwards dissolve in the acid. It is more advantageous to convert the precipitate into chloride than to cast it in metallic ingots, as the former, being very finely divided, is worth much more in the market. The mode of making crystallised chloride of tin is too well known to require description. The treatment of the residues insoluble in hydrochloric acid is important. These residues consist principally of chloride of lead and oxide of tin. These have been successfully treated in a small Belgian zinc oven, in which the residue is made of a red-heat in six retorts, arranged in two lines, and inclining forward at a considerable angle, after being mixed with twice its own weight of fine poor coal. If the residue contain sufficient chloride of lead all the tin will be transformed into volatile chloride, which condenses in the retort, and metallic lead is also formed, partly in the neck of the retort and partly mixed with the residue at the bottom, from which it is separated by washing. If there is not sufficient chloride of lead in the residue, some must be added from the receptacle described in paragraph No. 2.

4.—When only a small quantity of tin scrap is treated daily, and sulphuric acid can be obtained cheap, it may be advantageous to convert the iron from which the tin has been recovered into sulphate, but not when large quantities are dealt with. At Liège about 4 tons of tin scrap have been treated daily, which would give about 20 tons of sulphate of iron. Such a quantity could not be placed advantageously in Belgium. It was necessary, therefore, either to find other applications, or remove the prejudice against such scrap-iron. This scrap made up into compressed packets yields, with a loss of 20 to 25 per cent., an extremely brittle iron, but which may

be rolled hot, and then presents an excellent surface. The demand for this was, however, small. Another method, which succeeded better, was to make up the scrap in bundles of about 10 lbs. each, and to introduce them into the puddling-furnace to the extent of from 10 to 20 per cent. of the charge. The packets should be put in when the iron is most covered with scum. This scrap-iron exerts an especially favourable influence on pig containing much phosphorus; the puddled iron gains in quality, and the production is notably increased in quantity. While pig-iron of excellent quality has been obtained by smelting this scrap in a reverberatory furnace, mixed with turnings of grey pig to the extent of two to five. About 800 tons of this iron scrap have been sold in England, but for what purpose is not stated.

The cost of treatment on the basis of the price of iron in 1869-70, less the general expenses, is given as follows:—1 ton of tin-scrap, 60 fr.; 30 kilos. of hydrochloric acid, 9 fr.; 30 kilos. nitric acid, 15 fr.; 35 kilos. old zinc, 10 fr. 50 c.; labour, 20 fr.; fuel, 2 fr. 50 c.; total, 117 fr.—Result: 50 kilos. tin precipitate, 150 fr.; 800 kilos. scrap-iron, 24 fr.: total, 174 fr.

The industrial result depends upon the yield of tin, and consequently upon the careful purchasing of the scrap, for at the prices of iron in 1869-70 a yield of 3 per cent. of tin would not cover the cost of the operation.

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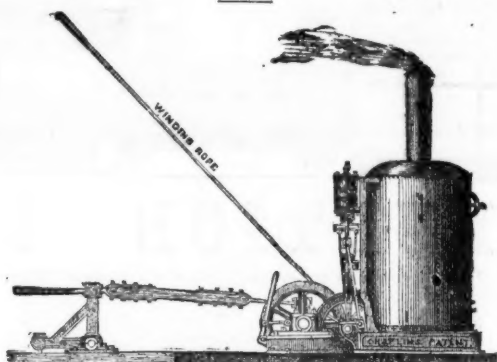
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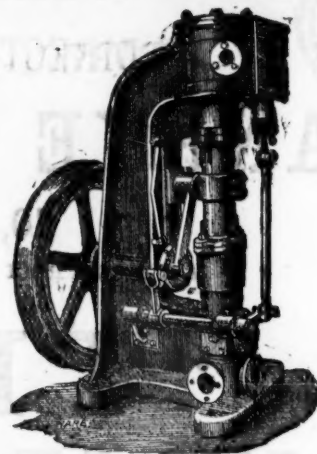
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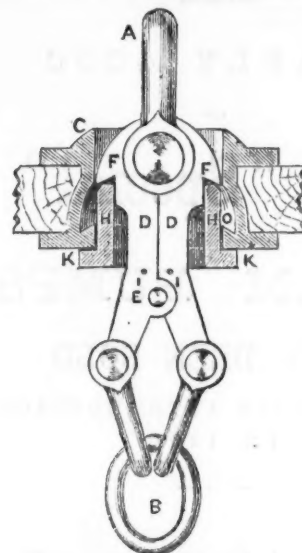


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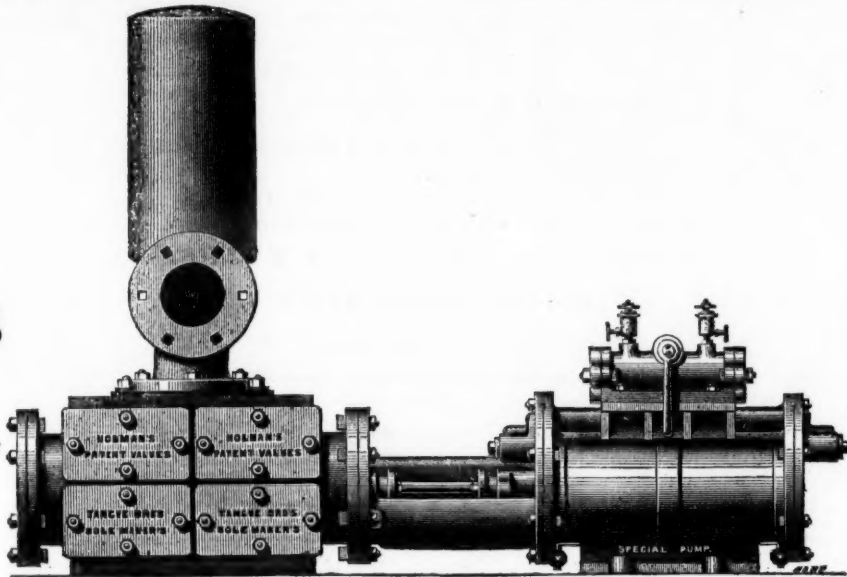
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Length of Stroke .....In.	9	9	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	18	12	12	12	18	24	12	12
Gallons per hour .....	680	815	1830	3250	1830	3250	5070	1830	3250	5070	7330	1830	3250	5070	7330	9750	3250	5070	7330	9750	13,000	5070	7330	9750	13,000	16,519	5070	7330
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Diameter of Water Cylinder..In.	7	8	9	10	6	7	8	9	10	12	7	8	9	10	12	14	8	9	10	12	14	9	10	12	14	14
Length of Stroke .....In.	12	18	24	24	18	18	18	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Gallons per hour .....	9750	13,000	16,519	20,000	7330	9750	13,000	16,519	20,000	30,000	9750	13,000	16,519	20,000	30,000	40,000	13,000	16,519	20,000	30,000	40,000	16,519	20,000	30,000	40,000	40,000
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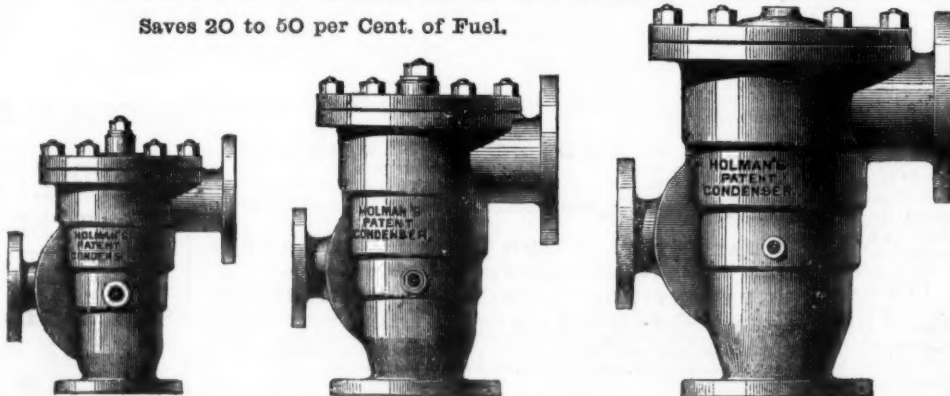
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